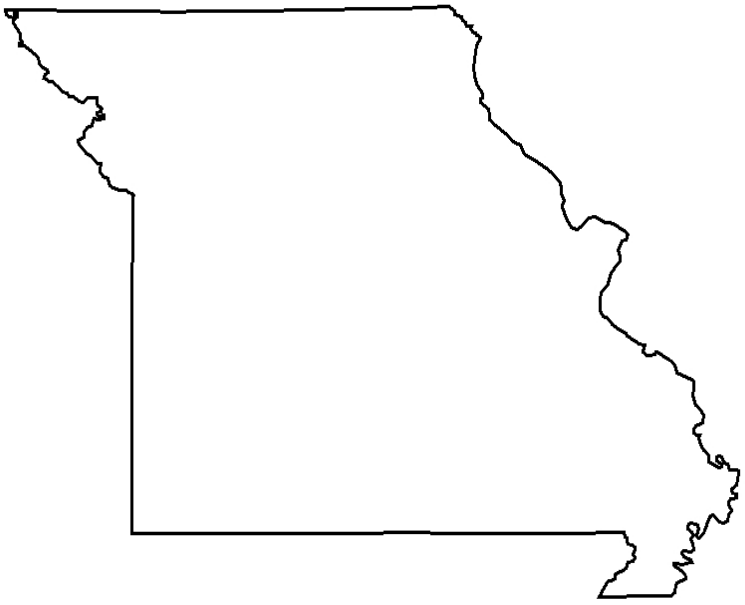
MISSOURI SOLID WASTE MANAGEMENT PLAN



Missouri Department of Natural Resources

November, 2005

TABLE OF CONTENTS

V. Appendices

A. Missouri Solid Waste Management Law
B. Solid Waste Management Regions of Missouri
C. The Missouri Solid Waste Composition Study-Introduction & Summary
D. The State of Garbage in Missouri (1999)
E. Missouri Public Opinion Survey on Solid Waste Management
F. Stakeholder Group Input
G. Policy for Recycling and Waste Reduction (State of Missouri Executive Branch Departments)
H. Solid Waste Award and Recognition Programs
I. Executive Summary: A Missouri Plan for the Safe Management and Collection of Household Hazardous Waste, Family Farm Waste, Conditionally Exempt Small Quantity Generator Waste and Do-It-Yourselfer Used Oil (2000)
J. Missouri Department of Natural Resources' Technical Bulletin, "The Universal Waste Rule in Missouri"
K. Missouri Mercury Task Force Goals and Objectives
L. The Study of White Goods Recycling and Disposal in Missouri-Introduction & Summary
M. Waste Tire Advisory Council Recommendations
N. Final Report of the Solid Waste Law Advisory Group

I. Introduction

Protecting human health and the environment is a job that is never finished. An unpolluted environment provides the clean air and clean water necessary for maintaining good health and human prosperity. A flourishing environment also provides food and raw materials to sustain life and offers recreational opportunities that can enhance the well being of individuals. Improper management of solid waste can lead to pollution of the air, land and water and contribute to the spread of disease. The Missouri Department of Natural Resources is charged with a number of duties and responsibilities to help ensure that solid waste is managed in a way that protects both public health and the environment. (Appendix A) While development of a statewide plan is one of these responsibilities, the department also believes that good planning is the foundation for carrying out any successful endeavor.

Since waste is an issue affecting all Missourians, it is our belief that the plan should include viewpoints from a broad range of stakeholders. Having input from Missouri stakeholders produce**s** a stronger plan and establish**es** a better basis for policy and action. The department incorporated into the plan input from a large number of stakeholders representing private citizens, business and industry, and state and local government. It was also clear that new strategies were needed to strengthen the traditional programs that have been effective in the past. New strategies must balance the demands of society, the environment and the economy.

One of the plan's most important functions is to provide a common basis for the governor, legislators, districts, communities and the department to make decisions regarding waste management programs and the resources needed to turn the plan into reality.

By no means is this plan meant to displace or diminish past efforts. Investments in waste management alternatives initiated in the past have increased the potential for continued stewardship into the future. It would be remiss not to mention some of the waste management accomplishments the state has realized over the past decade. In 1990, a major revision was made to the Missouri Solid Waste Management Law in Senate Bill 530. The law set a goal to divert 40 percent of the waste stream from landfill disposal that has been achieved. The law also created 20 solid waste management districts across the state to foster regional cooperation among cities and counties to help achieve the diversion goal. (Appendix B) The districts have played a significant role in the development of a statewide recycling infrastructure.

Solid Waste Management Regions of Missouri

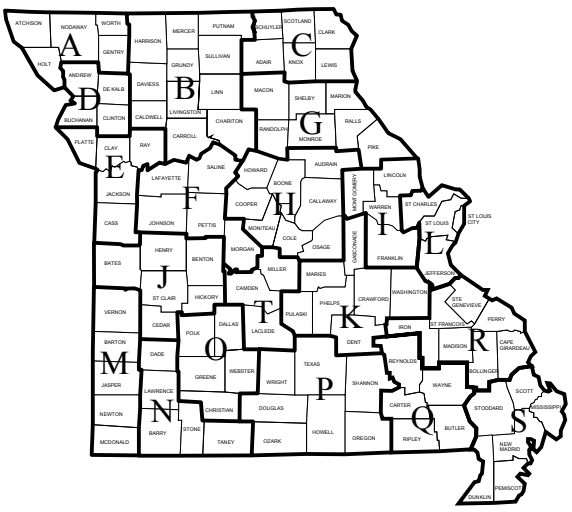


Figure 1

Educational efforts have helped encourage Missourians to recycle. This has contributed to the increase in the number and variety of reuse and recycling services available statewide.

Improved awareness and a sense of responsibility in all sectors are fundamental to reducing waste generation and management. That is why it is important to now focus on the implementation of this plan. There are roles and responsibilities for citizens, government and businesses alike to take part in. In order for this plan to succeed, it will be necessary for all parties to cooperate and be actively engaged in each of their respective tasks.

Trash represents the discards of our human existence. Finding ways to capture these castoffs as resources and put them to their best and highest use for society is our challenge. Thank you for sharing our commitment to environmental excellence, and to making Missouri a better place to live, work, and visit.

A. The Planning Process

In describing the process followed in development of this plan, it is important to emphasize that planning *is* a process. Compiling an array of background information and stakeholder input into this document involved several phases of activity, discussed below. However, the factors affecting how we manage solid waste are constantly changing: population growth and migration, economic conditions, solid waste industry consolidation, recycling market fluctuations and landfill technology, to name a few. Recognizing that these factors will never be completely static, the department endeavored to put on paper all of the information and input available to date to create this document and will continue to engage stakeholders in a process of solid waste planning and implementation.

1. Building the Foundation

The development of the plan should be built on a solid base: data from characterizations of the types and amounts of materials in the solid waste stream; information about the disposal, recycling and other resource recovery services in the state; surveys of citizens regarding their knowledge and attitudes about waste management; and input from a wide range of Missouri stakeholders.

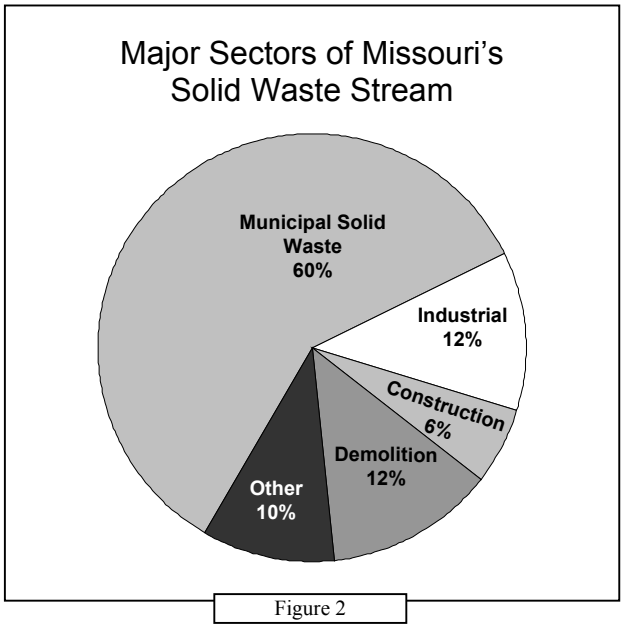


Figure 2

a. The Solid Waste Stream

Waste characterization studies are key planning tools, particularly for determining areas of the waste stream that need additional attention. The Midwest Assistance Program, Inc. conducted a two-phase Missouri Waste Composition Study from 1996 to 1999, funded by the Solid Waste Management Fund. (Appendix C) The first phase defined what and how much waste goes into the municipal solid waste stream--residences, schools, small businesses and other commercial activities. The second phase looked at construction and demolition, industrial, commercial and other wastes. Based on these studies, approximately

60 percent of Missouri's solid waste is created by homes and businesses, with significant portions generated by industries, construction and demolition activities.

Each year the department estimates the total amount of solid waste generated by all of these sectors. Data is compiled from Missouri landfill and transfer station tonnage reports, reports from other states and surveys of landfills in neighboring states. While diversion has increased, generation also continues to rise and the department's most recent estimates indicate nearly six million tons of solid waste continue to end up in landfills each year. (Figure 3)

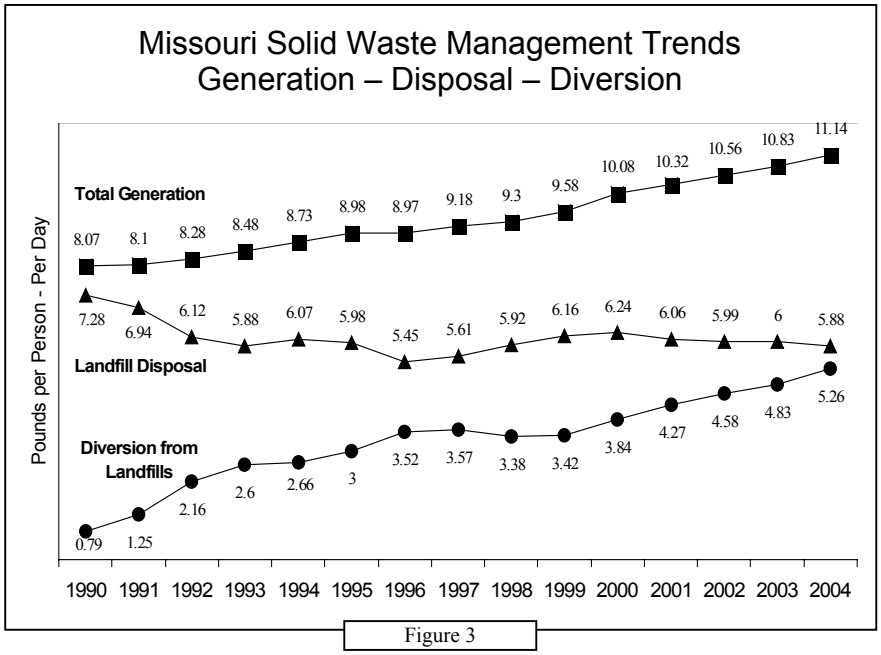


Figure 3

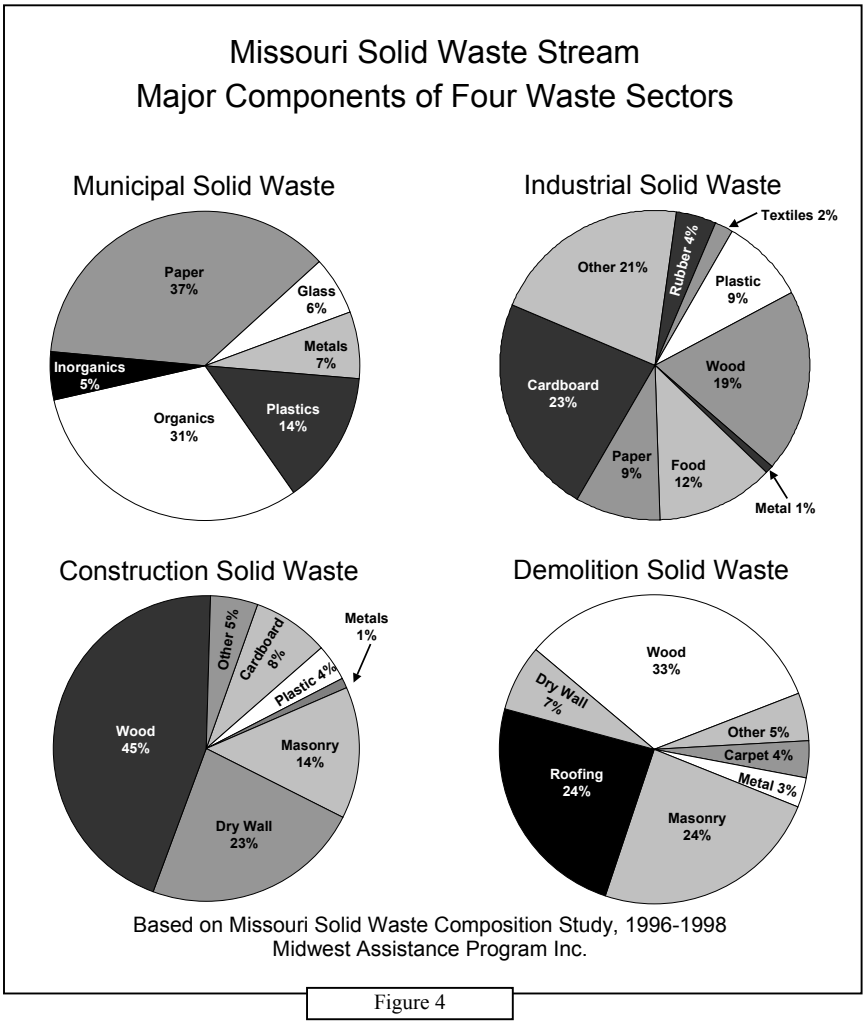


Figure 4

Understanding what's in the waste stream is also important. The waste composition studies also looked at the character of the major waste sectors. (Figure 4) This information helps to plan programs that focus on materials that dominate each waste stream.

b. Management Methods

To help lay the groundwork for plan development, the department conducted a review of how solid waste has been managed in Missouri. This review was formalized within a document titled *The State of Garbage in Missouri*. This report provides a brief history of solid waste management in Missouri, as well as an overview

of recent waste management practices and accomplishments. It provides insight into what has driven solid waste management progress through the years and serves to document existing conditions. (Appendix D)

Focus on Safe Disposal

Until the 1960s, solid waste was handled with little consideration of public health or environmental quality. As these repercussions were better understood, the state's laws, policies and practices shifted to make solid waste disposal safer and protective. At the federal level, Congress passed the 1965 Solid Waste Disposal Act. The Missouri Solid Waste Management Law was first passed in 1972 and aimed primarily at closing the open town dumps that prevailed in the state.

In 1976, federal law was amended by the Resource Conservation and Recovery Act (RCRA). The U.S. Environmental Protection Agency (EPA) is charged with administering RCRA, which established three main goals: protect human health and the environment; reduce waste and conserve energy and natural resources; and reduce or eliminate the generation of hazardous waste as expeditiously as possible.

To achieve these goals, four interrelated federal programs were established and regulations were adopted. The regulations and programs are commonly referred to by subtitle letter. Subtitle D concerns solid non-hazardous waste and has three primary goals: encourage environmentally sound solid waste management practices; maximize the reuse of recoverable resources; and foster resource conservation.

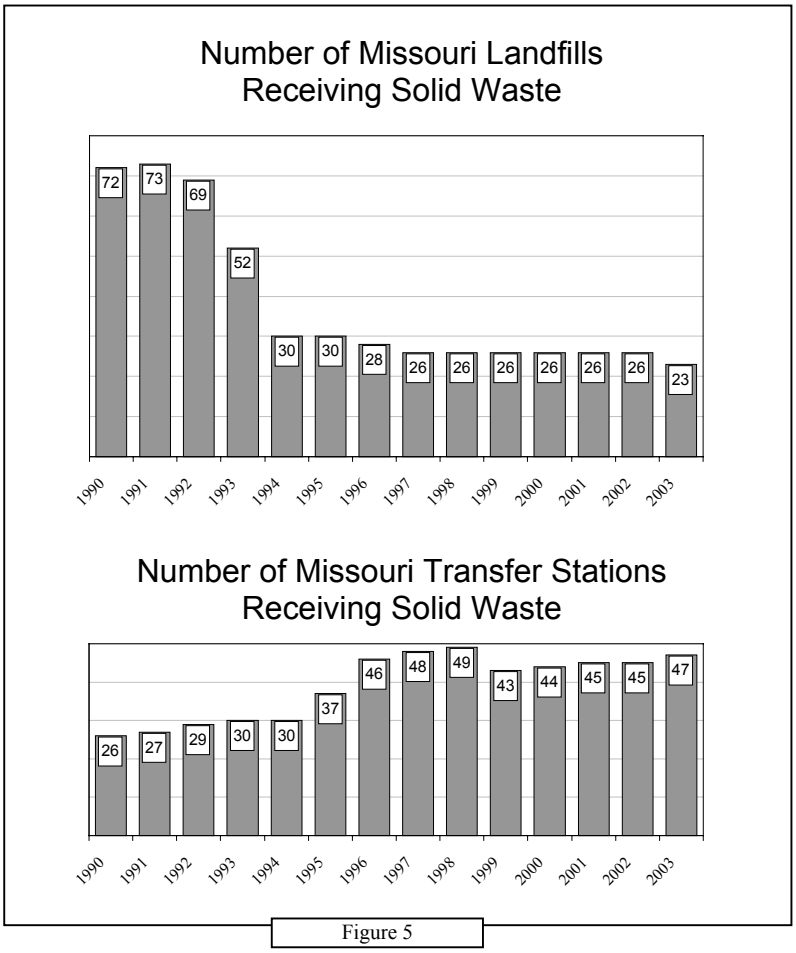


Figure 5

Major revisions to federal Subtitle D regulations became effective in Missouri in 1994. These revisions included a number of minimum criteria for landfills that accept municipal solid waste: location restrictions; facility design and operating criteria; groundwater monitoring requirements; corrective action requirements; and financial assurance and closure and post-closure care requirements. Subtitle D also provided flexibility for many location, design and operational requirements in states that developed comprehensive landfill permitting programs.

Missouri was one of the first states to receive Subtitle D approval from the EPA, allowing the department to

apply this flexibility in reviewing applications for landfill permits. Subtitle D approval also enables the department to issue permits for transfer stations, which can result in savings for both consumers and the solid waste industry.

For example, the federal regulations include a general prohibition on locating landfills in areas that are subject to sinkholes or are prone to earthquakes. This would eliminate the siting of landfills in large portions of the state. With the approved Subtitle D permitting program, the department's Geological Survey Program can work with permit applicants to properly characterize the geology and hydrology of proposed sites on a site specific basis.

While the new requirements meant greater protection from the potential problems associated with land disposal – methane gas migration, groundwater contamination, pollution of waterways – costs for building and operating a landfill rose. The number of transfer stations increased as the number of landfills decreased. (Figure 5)

Managing Waste as a Resource
Managing solid waste is continually changing because of public concerns, technological advances, economic trends and new laws or policies. As documented in the *State of Garbage*, legislation in the 1980s and 1990s included provisions for resource recovery. Senate Bill 530, a major amendment to Missouri Solid Waste Law passed in 1990, was the impetus for many of Missouri's advances in reducing disposal and increasing recycling and other landfill alternatives.

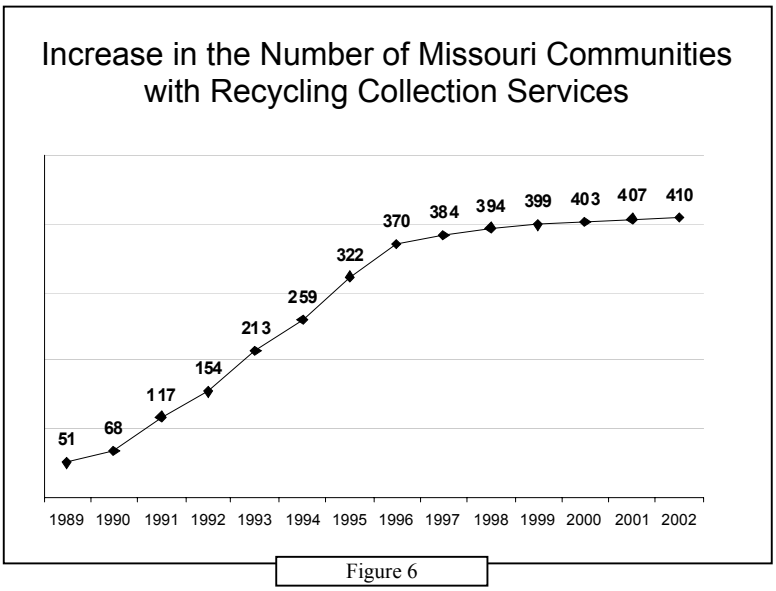


Figure 6

The number of communities with access to recycling services has risen from 47 in 1989 to 410 in 2002. (Figure 6) These programs made a substantial contribution to the year 2004 landfill diversion rate of 47 percent.

During that same period, services for yard waste grew from 112 communities in 1989 to 333 in 2002. (Figure 7)

Figure 7

This progress has been achieved by efforts at all levels--individual citizens, local and state government, solid waste districts, large and small businesses,

public institutions and not-for-profits. Legislation and policy have enabled the state to promote and support waste reduction and recycling by the following measures:

- Creating solid waste management districts to help cities and counties work cooperatively in the development of local waste prevention programs, resource recovery services and safe disposal options.
- Requiring that solid waste district plans follow an integrated waste management approach, emphasizing waste reduction and including services for both rural and urban communities.
- Creating and distributing planning guidance along with informational and educational materials that address alternatives to disposal.
- Minimizing regulatory requirements for recycling and composting facilities.
- Providing grant funding to assist in the development of the infrastructure for collection and processing of recyclables and organics.
- Supporting market development for recyclables to help develop a sustainable infrastructure.
- Providing technical assistance to public and private sectors.

2. Public Input for a Strong Plan

a. Public Opinion Surveys

Public opinion surveys conducted in late fall of 1999 and spring of 2004 provided insight into the average citizen's knowledge and understanding of Missouri solid waste management issues. The surveys also defined expectations of Missouri citizens concerning the present and future of solid waste management. (Appendix E)

Missourians who were surveyed rated the management and disposal of solid waste as the second most serious environmental problem in the state, slightly lower than water quality issues. Seventy-one percent said that they recycled in 1999, while seventy-four percent said they recycled in 2004, the top two reasons being to conserve resources and to teach good values.

b. Plan Stakeholder Process

A series of stakeholder meetings involved people from local government, solid waste management districts, regional planning commissions, businesses, organizations, institutions, private citizens and state agencies. The purpose of these work sessions was to bring together individuals with diverse viewpoints and experiences regarding different solid waste streams so that, through a facilitated process, they would provide input for the Missouri Solid Waste Management Plan. Before embarking on work with the stakeholders, department staff developed the following value statements regarding development of a statewide solid waste management plan:

- We have a responsibility to the well being of future generations by minimizing damage to the environment.
- Sustainable and renewable resources are essential for environmental quality.
- Solid waste management affects everyone and is everyone's responsibility.
- People with an understanding of how their solid waste impacts the environment make better decisions.

- The strongest plan is one in which those most affected by the plan are a part of the planning process.
- The plan should be strongly grounded with a broad range of citizen, business and government stakeholders.

Each stakeholder group addressed one of these five categories of solid waste: residential, institutional, commercial, industrial and construction and demolition wastes. The discussions within these groups resulted in the development of strategies for managing Missouri's solid wastes. Each of the stakeholder groups defined a purpose, expressed their vision for solid waste management in Missouri and prepared an action plan for solid waste management within their particular area. (Appendix F)

3. Preparation of the Plan

This plan is the result of organizing and synthesizing the information and stakeholder input described above. A draft document was developed, followed by a series of reviews by departmental staff, solid waste management districts, individuals who participated in the stakeholder groups and the general public. After department staff made revisions in response to the comments received, the plan was sent out for public review and comment.

4. Plan Implementation

This document outlines the actions the stakeholder groups identified for effective management of solid waste in Missouri. Some actions are currently being done while others are not, as explained in section IV. Action Development. A group of approximately thirty stakeholders – representing solid waste industry, solid waste management districts, cities, counties, recycling businesses and non-profit groups – prioritized a list of solid waste activities. Details regarding the process are discussed in section II. Implementation.

B. The Purpose of the Statewide Plan

The Purpose Statement should be the ultimate answer to the question, "Why create a plan for solid waste management?" The answer is not merely that a plan is referenced in state law. The answer must express the highest purpose for planning activities and programs, developing policies and allocating resources for solid waste management across the state in the coming years. In each stakeholder work session, participants were asked to develop a purpose statement for their portion of the plan. This may have been the most difficult task the stakeholders were given, but each group produced a meaningful statement that gave focus to the work that followed. These purpose statements can be found in each group's plan input document in Appendix F.

To develop a single purpose statement for the state plan, department staff synthesized the five stakeholder purpose statements into the following:

> **The purpose of the Missouri Solid Waste Management Plan is to contribute to the health, well being and quality of life for all Missourians by guiding the development of solid waste management systems which are environmentally and economically sustainable, efficient and effective.**

C. Values and Beliefs in Solid Waste Management

The development of the plan must rest on a set of core values and beliefs regarding both how solid waste is managed and the planning process itself. Each stakeholder group was asked to create a list of value and belief statements that reflect the very principles and standards that should guide decision-making and individual behavior in solid waste management.

The product of their effort clearly indicates that the stakeholders take seriously the responsibility of stewardship to protect and enhance the environment in which we live and work, and that they realize that all environmental aspects must be considered when making decisions regarding solid waste management (Appendix F). The five lists created by stakeholders were combined into a single list of value and belief statements reflective of Missourians as a whole:

- Waste management laws and regulations should be consistently and equitably applied and enforced.
- Managing solid waste should be economically feasible for all Missouri citizens, businesses and communities.
- Solid waste management practices must balance environmental and economic considerations.
- The use of the 3Rs (reduce, reuse, recycle, compost, energy recovery) should be emphasized in solid waste management.
- Missouri citizens have a right to a healthy and clean environment.
- Successful solid waste management is best served by ongoing input and active involvement from citizens, businesses and public entities.
- Successful solid waste management must consider the diversity of Missouri's people and environment and be responsive to a range of needs and issues.
- Everyone generates trash and is responsible for its proper management.
- Sustainable and renewable resources are essential for environmental quality and future well being.
- Missourians are responsible for the stewardship of natural resources for the well being of future generations.
- Quality solid waste management decisions are dependent upon an informed, knowledgeable public.
- Education is an essential element to successfully achieving the plan's goals.

D. A Vision of Future Waste Management

In the planning process, the Vision describes where we want the plan to take us; it is our overall sense of direction, the destination. The stakeholders were asked to imagine the state of solid waste management and the environment in Missouri 25 years from now, assuming that the best solid waste management plan had been developed and implemented between now and then. The end product of this activity was a series of vision statements. Ultimately, the Vision process is fruitful when it leads to the development of specific actions that will enable the visions to be realized.

The stakeholders' vision statements were compiled into the following list:

- Missouri is the leading state in waste management.
- Leadership in solid waste management is provided by government, institutions and industry.
- Missouri has clean air, water and land: beautiful countryside, biodiversity, zero emissions, increased green space, no open burning, a healthy and prosperous environment.
- Waste diversion goals are achieved, including significant reduction in solid waste generation.
- Environmental solid waste education is part of the school curriculum at all levels.
- Individuals, businesses and government understand how waste is managed and its potential impacts.
- Integrated solid waste management systems, including solid waste, reuse, recycling, composting and waste-to-energy services, are efficient, convenient and affordable.
- There is 100 percent participation in all elements of integrated solid waste management systems by individuals, businesses, institutions and government.
- Reuse, recycling, composting and waste-to-energy are maximized.
- Energy recovery processes convert solid waste to biomass fuel, use methane generated at landfills and provide alternative fuel for vehicles.
- Closed-loop industrial practices and industrial parks are common, and new businesses or ventures are developed using recycled materials to manufacture products.
- Product stewardship is a standard business practice.
- Products are designed for recyclability and with minimal packaging.
- Recycled products are equal to or better than those with virgin content, are readily available and are purchased by individuals, businesses and government.
- Green building practices are the norm, including preservation of existing structures, sustainable design and material reuse or recycling in both construction and demolition processes.
- Disposal practices utilize state-of-the-art technology to minimize environmental damage and increase resource recovery.
- Decreased governmental regulation is needed as a result of broad general compliance
- Every community has a solid waste plan and is responsible for proper solid waste management.

II. Implementation

A. Introduction

The plan incorporates the input from the five stakeholder groups' long-term vision for solid waste management in Missouri and the actions necessary to achieve that vision. The challenge now is to translate the actions into long-term implementation strategies.

During the process of plan development in calendar year 2003, funding for the department's solid waste activities was sharply cut. A separate group of approximately thirty stakeholders representing solid waste industry, solid waste management districts, cities, counties, recycling businesses and non-profit groups was convened to help determine options for new sources of revenue. As part of this process, this advisory group prioritized a list of solid waste activities created from two sources:

1. The actions proposed by the stakeholder groups for the statewide solid waste management plan. These actions were used to draft the Action Summary and Action Development sections of this plan.

2. A list of actions currently being conducted to carry out the duties and responsibilities specified in the Missouri Solid Waste Management Law.

The advisory group evaluated the list, using a scoring process to indicate the importance of each action. (Appendix N)

B. Core Activities

Core activities are those activities necessary to have for effective and efficient solid waste management in Missouri. Such activities should maintain an emphasis on an integrated approach to solid waste management. Implementation will reflect the resources available and the most critical issues. Continued long-range planning is critical to effectively guide solid waste management decisions that will protect Missouri's environment for future generations. The planning process also insures that these decisions reflect the values and needs of citizens, businesses and local governments.

The core activities in the Missouri solid waste management plan can be summarized as follows:

- Ensuring that the permit process for solid waste disposal and processing facilities is protective of the environment and public health, provides public participation and provides flexibility, where possible, for the regulated community;
- Providing technical guidance and assistance for the development of markets for recovered materials;
- Providing consistent, fair and thoughtful enforcement of solid waste laws and regulations
- Eliminating illegal dumping to the greatest extent possible;
- Providing education at all levels to ensure that citizens of Missouri make sound solid waste management choices;
- Ensuring that older facilities do not cause pollution, create a public nuisance or adversely affect the public health, and that corrective action is taken when they do;

- Permitting, enforcement and market development activities to ensure that waste tires are managed in a way that protects public health and the environment, as well as conserving a valuable resource; and
- Providing financial and technical assistance to increase the reduction, reuse, recycling, composting and energy recovery of solid waste.

C. Roles in Solid Waste Plan Implementation

The Department's Role in Solid Waste Plan Implementation:

Task 1. The department will concentrate on achieving Strategic Planning objectives that address solid waste management in Missouri.

In fulfilling its mission to "preserve, protect, restore and enhance Missouri's natural, cultural and energy resources," the department regularly engages in the strategic planning process. Managing solid waste is has always been an important component of this process. The following three objectives that address waste reduction and diversion, landfill permitting and solid waste enforcement, with strategies for meeting these objectives, were identified in past strategic plans.

Missouri Department of Natural Resources
Solid Waste Management Objectives and Strategies

Objective: Maximize the amount of solid waste recovered

Strategies

- Research and promote feasible alternatives to disposal of wastes in landfills.
- Promote unit-based pricing, also known as Pay-As You-Throw, strategies to encourage additional resource recovery.
- Promote integrated solid waste systems.
- Focus on areas of the waste stream that represent the largest portion, by weight, of waste that is disposed in landfills.
- Work with solid waste management districts to focus financial assistance on projects that minimize waste disposal and maximize resource recovery.
- Assist businesses with their ongoing solid waste reduction or recycling programs.
- Promote the purchase of products made with recovered materials.

Objective: Maximize compliance of solid waste disposal areas.

Strategies

- Promote public awareness and community involvement in the locating of landfills.
- Assist landfills with uncorrected methane gas migration problems to identify and remediate
- problems.
- Assist landfills to ensure proper installation of groundwater monitoring systems to verify that landfills are not polluting groundwater.
- Coordinate with the Division of Geology and Land Survey to ensure that landfills are located, designed and constructed to prevent environmental harm.

Objective: Minimize the amount of improperly disposed solid waste.

Strategies

- Develop and promote economical and convenient solid waste management services accessible to all Missourians.
- Clean up illegal waste sites, and promote local programs that discourage illegal dumping in order to prevent the need for future cleanups of open dump sites.
- Work with counties and cities with existing programs to discourage illegal dumping.

Task 2. The department will work with partners to develop specific goals and implementation timelines for actions.

Each action will require an action plan to be developed, approved and funded. Therefore, periodically reconvening of partners in work groups will be important to assist in prioritizing actions for implementation. Developing realistic implementation timelines and goals will be of utmost importance and will require the participation of a multitude of diverse entities since they will be involved in completing them. As action plans are developed and implemented, monitoring and evaluation are critical to adjust the action plans to meet the overall objectives.

Task 3. The department will provide periodic updates of plan implementation progress.

Information will be communicated in a variety of forms including:

- News releases;
- Publications;
- Web site postings;
- Presentations and
- Public service announcements.

Task 4. The department will assist districts, cities, counties, business and industry in identifying and addressing waste management issues to help them gain the insights, knowledge and experience needed to solve problems and implement change on their own.

This process, also referred to as capacity building, is the careful and supportive development of an organization's core skills and capabilities such as leadership, management, programs and evaluation that build the organization's effectiveness and sustainability. Ultimately, it is an investment in people, institutions and practices that, taken together, will enable Missourians to achieve solid waste management goals that conserve resources and protect the environment.

The department will facilitate capacity building through the provision of technical support activities including:

- Training workshops;
- Development of resource kits;
- Specific technical assistance and
- Resource networking.

Task 5. The department will collect, compile, analyze and make available solid waste information and education materials to inform Missourians about the necessity of proper management of solid waste.

The Role of Partners in Solid Waste Plan Implementation:

In section IV. Action Development, actions are presented along with descriptions of relevant current activities and potential implementation tasks. Additionally, a list of the partners who would be important participants in carrying out these tasks is given for each action. Partners may include solid waste organizations, state or federal agencies, local governments, businesses, institutions and especially solid waste management districts.

It is anticipated that the information provided in this plan will assist local entities when considering solid waste management alternatives. However, it is understood that additional factors may also need to be taken into account when making final decisions about moving forward with a particular action.

Task 1. Partners should to the greatest extent possible work with the department to develop specific goals and implementation timelines for actions so the successes of each if multiplied.

Task 2. It is hoped that Partners will, to the greatest extent possible, utilize the plan's Action Development section for developing implementation tasks at the local level.

Task 3. Partners should to the greatest extent possible work with the department to provide periodic updates of local plan implementation progress to the public.

These actions and potential implementation tasks are recommendations for regional and local consideration to help in the statewide achievement of the plan's vision. These proposals are made to provide guidance to regional and local entities and are not meant to be "imposed" by the plan on those entities.

D. Legislative and Regulatory Change

Many actions found in the plan would require changes in legislation or regulation before they could be implemented. Plan-related legislative or regulatory changes would be dependent upon further development of plan implementation strategies as described above. This does not preclude proposed legislation from being recommended as a need arises. It is recognized that local county, city and district officials play a vital role in the decision-making process and must be in general agreement with any proposed legislative changes.

III. Action Summary

The Visions represent the result of implementing an excellent solid waste management plan. The Actions are the things that need to be done to move from the present toward one or more of the Visions. The Actions presented in the plan are based primarily on input from the state plan stakeholder process and other single-issue stakeholder groups, with some modifications or additions based on department input and comments from the public review process.

Key Strategies for Action

The department reviewed over 250 recommendations for action and several key strategies emerged:

- **Partnerships**

  Each one of us generates solid waste in our day-to-day activities – at work or at home – and by special activities – going out to eat or attending a ball game. This means that there are numerous situations where a change in how we manage waste will involve or affect us. This also means that planning for solid waste management does not just involve people in waste management businesses, districts or the Missouri Department of Natural Resources. The department recognized the importance of including diverse viewpoints in the planning process by including private citizens and people from a range of businesses, local governments, non-profit groups, trade organizations and other state agencies in the stakeholder input process.

  The actions proposed during the stakeholder meetings included many other ways that partnerships can help to improve solid waste management in Missouri. By working together, the skills and assets of each sector – public and private – are shared in delivering services and making critical decisions. All parties have the opportunity to maximize resources, whether they are financial, human or material. Partnerships can improve communication, help identify potential problems and expand solid waste knowledge and awareness.

- **Education**

  Through education, current and future waste generators will learn to respect and conserve natural resources by making informed waste management choices. Education was advocated by every stakeholder group. This included school curriculum development, awareness campaigns and disseminating information about recycling and other waste reduction opportunities. These strategies cut across all management techniques, whether solid waste is minimized, recovered or disposed of in a permitted facility. In fact, the best educational or training programs recognize that each waste management approach is part of an integrated whole or the integrated waste management hierarchy. (Figure 8)

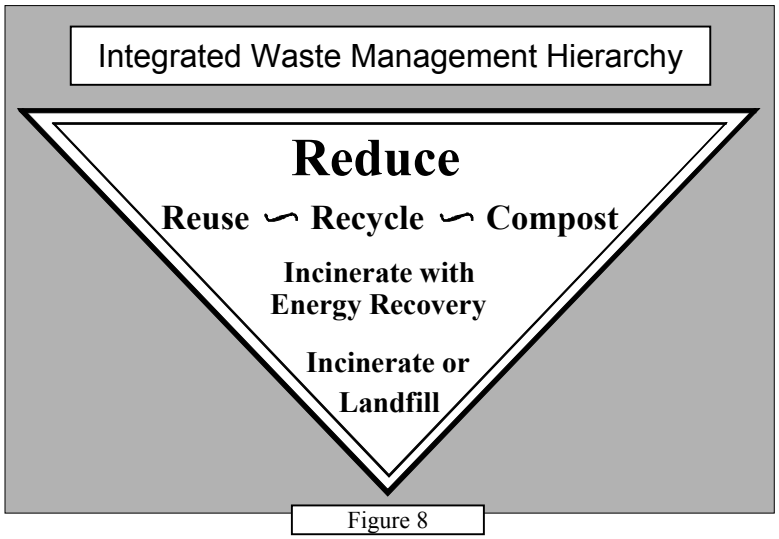


Figure 8

First, Reduce – Efforts to prevent the creation of waste should precede other waste management options that deal with the waste after it is generated, as in recycling. The underlying thought is that solid waste that is not produced does not require management.

Second, Reuse, Recycle, Compost – The next level includes reuse, recycling and composting. These techniques have the potential to divert large amounts of waste from disposal and turn them into valuable products. Through these techniques, waste materials can potentially go through several cycles of use, conserving raw materials and energy in the process.

Third, Energy Recovery – This level of the hierarchy also uses waste as a resource, but essentially the material can only be used once. The highest use becomes energy production.

Fourth, Disposal – After the first three levels of the hierarchy are maximized, there may be residual solid waste left to manage. This material must be disposed of in an environmentally safe manner, through incineration or landfilling at a permitted facility.

- **Incentives**

Stakeholders included both monetary and non-monetary incentives in their recommendations. One type of incentive would be recognition and awards for businesses, institutions or local governments that implement successful waste reduction and recycling programs. Another type of non-monetary incentive is created when laws and regulations are streamlined to allow public and private entities to use waste as a resource. Additionally, incentives are created when solid waste generators learn of the various options for using waste as a resource that currently exist in law and regulation.

Tax exemptions are one of the ideas for creating financial incentives for recycling put forth by the stakeholders. Currently state law provides a sales tax exemption for recycling equipment purchases. Creating any new tax incentives from the state would require a coalition of industry and government to ensure that costs and opportunities are in balance. Monetary incentives also come in the form of policies or programs that reduce the fee for disposal when waste is reduced or diverted through recycling or composting.

- **Financial Assistance**

  To continue making progress in solid waste management, the state will need new or expanded services, a range of educational programs and further development of the infrastructure that provides recycling and other waste reduction opportunities. Each stakeholder group emphasized the importance of providing financial assistance to make this happen. By instituting a tonnage fee on waste disposal in 1990, Senate Bill 530 created the Solid Waste Management Fund.

  This fund makes it possible for the department, the solid waste management districts and the Missouri Market Development Program to help both public and private entities. In turn, these entities contribute to the development of an adequate solid waste management infrastructure so that source reduction, reuse, recycling, composting and waste-to-energy technologies may become regular and affordable activities of state and local governments, industries and citizens.

- **Technical Assistance**

  While financial assistance is critical to making progress in solid waste management, technical assistance also plays an important role. Many of the approaches to better waste management are not new in concept, but are more complex and broader in scope than ever before. Programs must be designed to be convenient, efficient and cost effective. They must be able to handle new waste streams as new products are introduced into the market place.

  Technical assistance provides a mechanism for sharing best practices and the latest technical information on solid waste management. It can include distributing guidance materials, conducting waste audits, performing program reviews or providing technical training. Technical assistance is an activity that can come from both the public and private sectors, providing important opportunities for new partnerships.

- **Mandates**

  Throughout the stakeholder process, the idea of instituting mandates to change solid waste management in Missouri was proposed. However, deciding which mandates should be endorsed would require additional work with stakeholders to ensure that a strong base of support is in place. Additionally, mandates must be compatible with Missouri's constitution and laws.

  Some of the suggested mandates are already contained in statute: requiring municipalities to develop a solid waste management plan (Sections 260.220 and 260.325 RSMo) and recycled-content purchasing by state offices (Section 34.031.1 RSMo). Some represent a direction that the department has long advocated, but has not been supported through legislation, such as no residential trash burning. Those that represent new requirements for individuals, businesses and local government will require careful consideration of both positive and negative impacts prior to adoption.

In this section, the actions have been placed under overarching objectives and organized into four categories: Education for All, Managing Waste as a Resource, Safe Disposal Practices and Special Solid Waste Issues. At this time, the actions have not been prioritized in any way. Prioritization of actions through stakeholder input will be necessary for implementation. In section IV of the plan, the objectives and actions are presented along with descriptions of related activities conducted by state and local entities, lists of partners and potential implementation tasks.

A. Education for All

K-16 Formal Education

Objective 1: Children in grades K-3 should be able to recognize reduce, reuse and recycle (the 3Rs) as a standard method for managing waste items and exhibit appropriate behaviors such as source separation and litter control.

Actions

1a. Develop school-wide 3Rs programs for managing wastes.
1b. Teach students about the environment and our dependence on resources.
1c. Promote public campaigns such as Missouri Recycles Day.
1d. Develop and distribute hands-on materials to help teach about the 3Rs.
1e. Correlate solid waste education materials and programs with the Missouri Show-Me Standards for school curriculum.

Objective 2: Students in the middle grades (4-8) should understand how our use of resources can result in disruption of the natural environment and how managing waste properly helps protect the environment.

Actions

2a. Integrate solid waste environmental education with other subjects or thematic units.
2b. Provide opportunities for students to examine, in depth, local solid waste issues and possible solutions to those issues.
2c. Have students develop and implement a waste reduction program at their school.
2d. Promote and encourage student behavior that illustrates individual responsibility for managing their wastes.

Objective 3: Upon graduation, high school students should be able to make informed decisions about their role as consumers of products, generators of waste and as stewards of the environment.

Actions

3a. Develop lessons from which students can identify strategies to reduce their use of resources, thereby reducing the amount of waste they generate.

3b. Educate students about individual responsibility for the wastes they generate, including pre-cycling or purchasing items that have less packaging or that use post-consumer recycled material in the packaging or in the product itself.

3c. Educate students about the importance of adopting a lifestyle based on the efficient and sustainable use of resources, in order to achieve a sustainable society.

Objective 4: College and university students should have the opportunity to learn about solid waste management through a variety of course offerings or through direct experience.

Actions

4a. Modify the core requirement for natural and social sciences to include a course that meets established guidelines for environmental literacy.

4b. Promote green campus policies that help get staff and students alike into the habit of recycling while setting a positive example for transfer to society in general.

4c. Teacher education programs should incorporate a course in environmental education methods for undergraduates and promote interdisciplinary degree programs.

Non-Formal Education

Objective 1: Workshops on solid waste management issues need to be made available to in-service teachers to provide them with expertise and experiences they can directly use in their classrooms.

Actions

1a. Government agencies such as the Missouri Department of Natural Resources offer solid waste workshops to in-service teachers or assist others in doing so.

1b. Educational providers should design their services to meet the needs of teachers who wish to help their students learn about local environmental issues such as solid waste management.

1c. State and local solid waste agencies should work together to determine how to reach schools to provide experiences that otherwise would not be available to teachers and their students.

Objective 2: Citizens should be able to participate in available hearings, meetings and workshops that provide solid waste information and address solid waste issues.

Actions

2a. Train community leaders to educate others about integrated waste management practices.

2b. Promote the purchasing of recycled products and the concept of a total recycling system.

2c. Promote solid waste management awareness through community education programs.

Objective 3: Provide information that enables consumers to participate fully and effectively in management practices that reduce wastes.

Actions

3a. Maintain updated lists of recycling facilities, transfer stations, disposal facilities and collection options for citizens to find out what they need to do and how much it will cost.

3b. Use the media and public ad campaigns to promote the 3Rs, waste-to-energy and the concept of integrated waste management.

3c. Provide opportunities for consumers to get involved in determining costs, implementing new practices or to providing input for special topics such as reduced packaging.

Management Training

Objective 1: Technicians and Administrators – Provide training which addresses the specific skills and decision-making abilities that elected officials and business and manufacturing leaders must have to make solid waste management possible.

Actions

1a. Administer and share results of constituent surveys to foster communication between consumers and management personnel.

1b. Inform constituents to involve them in the decision-making process.

1c. Require training for solid waste managers in landfill management, collection options and other aspects of managing solid waste.

Objective 2: Business and Manufacturers - Businesses and manufacturers, representing the front end production of the life cycle of various products, should fully understand what they can to reduce waste, use less packaging and make durable products.

Actions

2a. Provide training to manufacturers about life-cycle analysis and how managing waste as a resource can be an asset rather than a cost.

2b. State agencies should provide opportunities to update business leaders on waste issues and best available practices for reaching reduction goals.

B. Managing Waste as a Resource

For *All* Generators: Residential, Institutional Commercial, Industrial, Construction and Demolition

Objective 1: Provide incentives that encourage the safe and environmentally sound management of all types of solid waste, minimizing disposal and maximizing resource conservation.

Actions

1a. Recognition programs for waste reduction, recycling, composting and other alternatives to disposal.

1b. Provide tax incentives for recycling collection, recycling research and development, development of new recycled products, co-collection systems and waste-to-energy projects.

1c. Encourage the use of deposits for beverage containers to increase recycling of aluminum cans, plastic bottles and glass bottles.

Objective 2: Provide financial assistance for programs and activities designed to reduce, reuse, recycle, compost or recover energy from solid waste.

Actions

2a. Direct grants and other financial assistance toward projects which meet the greatest needs of Missouri's waste reduction infrastructure. This would include reuse, recycling, composting and waste-to-energy projects. Funds should be provided for recycling start-ups or venture businesses and technical research and development.

2b. Use federal funds for technical research of alternatives to disposal.

2c. Garner venture capital from the private sector to help create a commercially viable recycling industry.

Objective 3: Provide technical assistance to citizens, local governments, non-profit organizations, institutions and businesses in order to assist them in reducing solid waste at the source and using alternatives to disposal.

Actions

3a. Create solid waste management cross-department databases, including available solid waste services, financial assistance and other resources.

3b. Provide model contracts for solid waste services that provide dollar incentives for waste reduction and recycling.

3c. Promote model programs and best practices.

3d. Promote the use of waste audits to help design and evaluate programs.

For Residential Solid Waste

Objective 1: Increase source reduction and reuse of residential waste.

Actions

1a. Create or expand community source reduction programs.
1b. Create new reuse programs and promote existing opportunities.

Objective 2: Increase the number of communities using unit or volume based solid waste collection systems such as Pay-as-You-Throw to create financial incentives for waste reduction and resource recovery.

Actions

2a. Provide technical assistance to help create or expand Pay-as-You-Throw solid waste collection systems.
2b. Provide financial assistance to help create or expand Pay-as-You-Throw solid waste collection systems.

Objective 3: Maximize recycling collection opportunities and ensure that residential recycling programs are sustainable.

Actions

3a. Provide technical assistance to create, expand and improve residential recycling programs.
3b. Provide financial assistance for communities and private haulers to help create, expand and improve recycling collection services for residential waste. Place greater emphasis on projects designed to improve efficiency and ensure sustainability.

For Institutional Solid Waste

Objective 1: State and local governments provide leadership through their policies and practices for managing the solid waste they generate.

Actions

1a. Adopt comprehensive waste reduction policies.
1b. Evaluate current waste reduction programs.
1c. Create or expand source reduction, reuse, recycling, composting and waste-to-energy programs for government facilities.
1d. Increase awareness of accomplishments in waste reduction.

Objective 2: Institutions of all types maximize their waste reduction, reuse and recycling.

Actions

2a. Evaluate programs in place for major types of institutions: health care, correctional, research facilities or other similar facilities.

2b. Provide technical assistance to create, expand or improve waste reduction programs that complement or enhance the institution's primary mission.

2c. Increase the reuse of institutional waste.

For Commercial and Industrial Solid Waste

Objective 1: Business and government adopt product stewardship policies and goals.

Actions

1a. Promote product stewardship concepts and principles.

1b. Facilitate process of stakeholder input for policy and goal development.

Objective 2: Promote the establishment or expansion of waste-based businesses to increase waste diversion and enhance economic development.

Actions

2a. Research the impact of waste-based businesses on Missouri's economy.

2b. Promote industrial development that creates by-product synergy.

2c. Increase the use of existing reuse and recycling services by commercial and industrial generators.

For Construction and Demolition Solid Waste

Objective 1: Prevent solid waste through reuse of buildings.

Actions

1a. Promote building reuse and historic preservation.

1b. Provide technical and financial assistance for building reuse and historic preservation.

Objective 2: Reduce waste and increase recovery in construction and demolition processes.

Actions

2a. Promote waste reduction as part of the green building concept.

2b. Expand processing of construction and demolition waste to increase resource recovery while protecting the environment.

2c. Promote and increase reuse opportunities for construction and demolition waste.

Recycling Market Development

Objective 1: Create new markets and strengthen existing markets for recovered materials in Missouri.

Actions

1a. Promote the purchasing of recycled-content products by individuals, businesses, institutions and government offices.
1b. Create financial and other incentives for market development and publicity.
1c. Conduct periodic review of recyclable materials marketability.
1d. Develop local end-use markets.
1e. Help manufacturers of recycled products adopt technologies or processes to help increase efficiency, productivity and profitability.
1f. Create more recycled products.
1g. Financial assistance to support end markets, for new market research and development, for advertising recycled products and for business subsidies to encourage use of recycling markets.

Organics in Solid Waste

Objective 1: Reduce a significant amount of the organic waste that is currently being disposed in landfills.

Actions

1a. Encourage programs and activities that reduce the amount of organic materials destined for landfills, including backyard composting.
1b. Encourage programs and activities that divert organic materials from disposal in landfills through reuse.

Objective 2: Recover a significant amount of the organic waste that is currently being disposed in landfills.

Actions

2a. Encourage the effective recycling of organic materials from the waste stream.
2b. Continue encouraging the use of composting to produce rich organic soil amendments from organic materials such as food residuals, wood waste and yard wastes.
2c. Develop and update information regarding composting for individuals, businesses and decision-makers.
2d. Develop educational seminars and workshops regarding composting for individuals and businesses.
2e. Encourage the use of organic materials from municipal solid waste to produce energy when the organic materials cannot be reused, recycled or composted.
2f. Encourage economically sustainable capture and use of methane gas in Missouri landfills.

C. Safe Disposal Practices

Permitted Facilities

Objective 1: Promote alternative waste disposal and management.

Actions

1a. Encourage energy use plans in landfill permits.
1b. Promote waste collection services in areas not presently served by collection services such as green boxes.
1c. Promote siting of more construction and demolition landfills.
1d. Streamline regulations and permitting process to more easily use by-products and resources.

New Technologies

Objective 1: Pave the way to new, cleaner, safer and more cost-efficient methods of managing solid waste in Missouri.

Actions

1a. Research and develop lower cost alternatives for landfill mining.
1b. Research and develop innovative ways to properly close and maintain old landfills that do not have financial assurance instruments.
1c. Design future landfills as planned resource recovery facilities.

Illegal Dumping Enforcement and Prevention

Objective 1: Work toward having a cleaner environment and use of safe disposal methods.

Actions

1a. Allocate funding sources toward illegal dumping.
1b. Enforce littering laws and educate constituents and voters regarding anti-littering campaigns.
1c. Enhance enforcement activities to prevent illegal dumping, enforce existing laws and increase inspections.
1d. Regulators focus on long-term solutions and either ease or strengthen regulations. Look at the possibility of legislative action.

Technical Assistance

Objective 1: Provide technical assistance and guidance to businesses, governments and individuals regarding solid waste permitting and enforcement issues.

Actions

1a. Establish and maintain open lines of communication with the regulated community and the general public with respect to technical matters.

1b. Develop and maintain appropriate workshops regarding technical issues.

D. Special Solid Waste Issues

Household Hazardous Waste (See Household Hazardous Waste Plan in Appendix I)

1. Electronics

Objective 1: Maximize to the greatest extent possible, the collection, reuse and recycling of used electronics.

Actions

1.a. Inform consumers of the hazardous nature of the materials in consumer electronics and encourage them to use recycling and reuse programs.

1.b. Encourage the establishment of new and continue operation of existing electronics collection, recycling and refurbishing businesses.

1.c. Assist in the development of programs that encourage retailers to accept old electronics for recycling.

1.d. Continue to participate in organizations that encourage product stewardship.

2. Mercury

Objective 1: Educate the public on potential mercury dangers, sources of mercury, fish advisories, take-back programs and safer alternatives.

Actions

1.a. Develop and incorporate mercury instruction and educational materials for classroom use and distribution to the public.

1.b. Provide ongoing information to the public regarding the hazards of mercury as well as efforts in reducing mercury contamination.

Objective 2: Reduce potential mercury exposures and releases to the environment.

Actions

2.a. Encourage use of non-mercury containing devices and increase recycling opportunities for mercury-containing products.

2.b. Promote industry-sponsored take-back programs for mercury-containing products.

Materials Banned from Missouri Landfills

1. Major Appliances

Objective 1: Reduce illegal dumping and increase recycling of major appliances, also known as white goods.

Actions

1a. Provide additional information and education materials regarding major appliance recycling to public and private sectors.
1b. Encourage solid waste management districts to conduct major appliance collections.
1c. Provide funding for refrigerant extraction certification and equipment.
1d. Create a fee system to subsidize major appliance recycling and illegal disposal cleanup.
1e. Encourage better end markets for scrap metal.
1f. Assist small businesses that want to collect major appliances by streamlining the regulatory process.
1g. Encourage reuse, repair and recycling of major appliances.

2. Lead-Acid Batteries

Objective 1: Continue collection and recycling of lead-acid batteries.

Action

1a. Work with retailers and solid waste management districts to continue collection of lead-acid batteries.

3. Used Oil

Objective 1: Encourage continued proper management and recycling of used oil and increase voluntary participation of businesses and local governments in do-it-yourself used oil collection programs.

Actions

1a. Educate public, private and business sectors about proper management techniques and recycling opportunities for used oil through written and media avenues.
1b. Encourage more Solid Waste Management District household hazardous waste collection programs to include used oil in their collections.
1c. Target grants to develop used oil recycling and collection enterprises.

Objective 2: Provide technical assistance and information regarding used oil collection locations in the state.

Action

2a. Compile and maintain a database of all used oil collection services in the state.

4. Whole Tires

Objective 1: Provide incentives that encourage the safe and environmentally sound management of waste tires, minimizing disposal and maximizing recycling of waste tires into Tire-Derived-Fuel and beneficial end-use products such as playground cover material. This objective addresses the five percent of waste tires currently not accounted for in the current infrastructure of the waste tire industry.

Actions

1a. Require permits for waste tire sites, processors and haulers.
1b. Enhance established controls for permitting, enforcement and inspections.
1c. Ensure that tire collection centers such as tire retailers, service stations and salvage yards are properly managed to prevent vermin and fire hazards by recycling or disposing tires.
1d. Address the five percent of waste tires that are not accounted for through the existing infrastructure by enhancing the tracking system.
1e. Increase collection center inspections.

Objective 2: Provide technical assistance to citizens, local governments, non-profit organizations, institutions, business and the waste tire industry in order to assist them in reducing waste tires at the source, using alternatives to disposal and using sound practices for properly managing waste tires. The technical assistance will provide them with options for the cleanup, proper disposal and recycling of waste tires to prevent illegal waste tire dumps, infectious diseases and tire fires.

Actions

2a. Conduct inspections and enforcement actions against violators of the waste tire law.
2b. Assist local governments with waste tire control efforts and illegal dump cleanups.
2c. Provide technical assistance to the public, legislators and other officials, tire retailers and recyclers.
2d. Disseminate the department's *Management of Waste Tire - Technical Bulletin* on how to prevent tires from becoming mosquito breeding grounds.
2e. Provide information on tire fire prevention through the department's *Response to Tire Fires –Technical Bulletin.*
2f. Provide monetary assistance for the cleanup of innocent party tire dumps statewide to prevent mosquito-borne illnesses and the proliferation of vermin.
2g. Offer incentives to property owners who self-report their tire dumps to sign innovative settlement agreements.
2h. Reimburse non-profit groups for their waste tire cleanups to encourage citizen participation in the maintenance of our environment and to educate the public.

Objective 3: Develop the waste tire market to the point where waste tires have value. In doing so, the waste tires currently in dumps will be removed from the dumps, by the landowners themselves, and taken to the waste tire recyclers to be used as a raw material in the manufacture of tire-derived fuel and new products.

Actions

3a. Provide grants for schools, parks and other non-profit entities to purchase playground cover made from tires to protect children from injuries from falls.

3b. Promote the use of rubberized asphalt and the use of crumb rubber in the manufacture of new products.

3c. Encourage power plants and cement kilns to use tire-derived fuel, lowering their emissions and using more tires.

3d. Augment market development via Waste Tire Grant Program.

3e. Coordinate with other state agencies and industry to introduce more waste tire-derived materials in their projects and the use of waste tires in civil engineering applications.

IV. Action Development

In this section, Actions have been further developed to include discussions under the following headings.

Current Programs and Activities: This section describes programs or activities that have been conducted or are currently in place to address the proposed action. If there are no current programs or activities, there may still be some discussion on the topic.

Partners: This section lists the partners who are either already involved in the Current Programs and Activities, or who would be important participants in the development and implementation of new programs and activities.

Potential Implementation Tasks: To flesh out the Actions recommended by stakeholders, department staff developed a list of potential tasks that could be part of plan implementation. This may include model programs in Missouri, another state or at the national level to emulate, current programs or activities that should be continued or new programs or activities which would need to be initiated. These come from a number of sources: successful programs funded by State Grants or District Grants; U.S. Environmental Protection Agency guidance materials; guidance and information from other states, solid waste and recycling organizations; and suggestions from stakeholders.

The tasks suggested are not comprehensive. Although these may be interpreted as activities primarily for the department, the goal is for these to be shared activities, carried out by public and private entities, and at the local, regional or state level, as appropriate. The specific tasks and the entities responsible for implementation cannot be determined by department staff alone. Further collaboration with a range of stakeholders will be necessary to prioritize tasks, determine responsible parties and create timelines for implementation.

A. Education for All

Effective solid waste management is dependent upon everyone having a level of understanding about solid waste issues and solutions that enables them to participate in the best management practices. Such an understanding can be gained through tailored education or training programs for formal education (K-16), non-formal programs such as workshops, special interest meetings and consumer information and relevant training and skills for those in waste management positions. Specific objectives and actions for these three categories are described in this section. Many of the actions may be appropriate for more than one objective.

K-16 Formal Education

Solid waste education needs to be addressed at all levels of formal education to establish adequate understanding and appropriate behaviors regarding individual responsibility for solid waste management.

Objective 1: Children in grades K-3 should be able to recognize reduce, reuse and recycle (3Rs) as a standard method for managing waste items and exhibit appropriate behaviors such as source separation and litter control.

Actions

1a. Develop school-wide 3Rs program for managing wastes.

Current Programs and Activities: *Wildwood Babes* coloring books are a department- produced coloring and activity book geared for K-3 that addresses waste reduction, reuse and recycling;

Partners: Missouri Department of Natural Resources.

Potential Implementation Tasks:
- Continue to endorse or encourage current programs.
- Continue to research and develop new projects.

1b. Teach students about the environment and our dependence on resources.

Current Programs and Activities: *ReSource Your Waste* is a teachers guide developed for grades 4-8, but several activities may be easily adapted to address K-3 grade levels.

Partners: Missouri Department of Natural Resources and the Missouri Department of Elementary and Secondary Education.

Potential Implementation Tasks:
- Review of National Geographic Standards for K-3 standards.
- Review North American Association for Environmental Education guidelines for educational materials.

1c. Promote public campaigns such as Missouri Recycles Day.

Current Programs and Activities: The U.S. Environmental Protection Agency (EPA) has developed a guide book for setting up recycling programs in schools. The Missouri Recycling Association sponsors a recycling poster contest for grades K-12 that coincides with Missouri Recycles Day. The Missouri Waste Control Coalition sponsors an environmental greeting card competition each year for grades 5-9.

Partners: Missouri Recycling Association and the Missouri Department of Natural Resources.

Potential Implementation Tasks:

- Endorse programs that encourage recycling and waste management activities that involve children at an early age.
- Continue efforts to develop new programs to promote 3Rs.

1d. Develop and distribute hands-on materials to help teach about the 3Rs.

Current Programs and Activities: The Missouri Department of Natural Resources has developed and distributed nearly 50 Travelin' Trash Kits statewide. These kits provide hands-on materials for teachers to use in the classroom to teach about the 3Rs. The St. Louis Teachers Recycle Center is an exchange program that reuses surplus and waste materials. These materials include art and crafts materials along with regular school supplies. Materials are available to teachers at little or no cost.

Partners: Missouri Department of Natural Resources and the Solid Waste Management Districts.

Potential Implementation Tasks:

- Promote use of kits through conference presentations and other media, workshops and consulting.
- Encourage development of waste exchange programs in other areas of the state.

1e. Correlate solid waste education materials and programs with the Missouri Show-Me Standards for school curriculum.

Current Programs and Activities: While many educational materials covering the subject of solid waste management exist, many may not be used by Missouri teachers because corresponding Show-Me Standards for the activities have not been provided. Missouri's Show-Me Standards have been developed to identify minimum core competencies for students in Missouri's schools. Solid waste management issues cross several subject areas including science, math and social studies. The department's *ReSource Your Waste* has identified Show-Me Standards for each of the activities.

Partners: Missouri Department of Elementary and Secondary Education and the Missouri Department of Natural Resources.

Potential Implementation Tasks:
- Continue to make Missouri teachers aware of solid waste curricula that have correlated Show-Me Standards.
- Continue to develop materials that include the Show-Me Standards.

Objective 2: Students in the middle grades (4-8) should understand how our use of resources can result in disruption of the natural environment and how managing waste properly helps protect the environment.

Actions

2a. Integrate solid waste environmental education with other subjects or thematic units.

Current Programs and Activities: Courses offered through the department's Outreach and Assistance Office-Environmental Education Education Unit.

Partners: Missouri Department of Natural Resources, Missouri Department of Elementary and Secondary Education, Missouri Environmental Education Association and teachers.

Potential Implementation Tasks:
- Develop examples of solid waste issues that cross different subject areas, especially math, science and social studies.

2b. Provide opportunities for students to examine, in depth, local solid waste issues and possible solutions to those issues.

Current Programs and Activities: Investigating and Evaluating Environmental Issues and Actions training for investigation approach, Project Learning Tree, Project WET and Project Wild.

Partners: Missouri Department of Natural Resources, Solid Waste Management Districts, local governments and schools.

Potential Implementation Tasks:
- Encourage teachers to receive training in the three Project programs.

2c. Have students develop and implement a waste reduction program at their school.

Current Programs and Activities: LEAP Program.

Partners: Missouri Department of Natural Resources and Gateway Center for Resource Efficiency.

Potential Implementation Tasks:

– Encourage schools to investigate EPA guidelines for developing school recycling programs.

2d. Promote and encourage student behavior that illustrates individual responsibility for managing their wastes.

Current Programs and Activities: There are several recognition events available to students, such as the annual competition for the department's Earth Day slogan, the Missouri Recycling Association calendar picture contest and the Missouri Waste Control Coalition annual environmental greeting card program.

The Investigating and Evaluating Environmental Issues and Actions (IEEIA) teaching technique is an excellent tool for educators to use. IEEIA promotes citizenship and responsibility in students as they learn about an environmental issue. A series of case studies showing how IEEIA can be applied to solid waste education can be found in the publication *A Science-Technology-Society Case Study: Municipal Solid Waste*, authored by John Ramsey, Harold Hungerford and Trudi Volk.

Partners: Missouri Department of Elementary and Secondary Education and the Missouri Department of Natural Resources.

Potential Implementation Tasks:

– Encourage student-led school recycling programs as suggested in *ReSource Your Waste*.
– Encourage educators to review and use *A Science-Technology-Society Case Study: Municipal Solid Waste* in curriculum development.

Objective 3: Upon graduation, high school students should be able to make informed decisions about their role as consumers of products, generators of waste and as stewards of the environment.

Actions

3a. Develop lessons from which students can identify strategies to reduce their use of resources, thereby reducing the amount of waste they generate.

Current Programs and Activities: Environmental Education Forum Decision Option. In this model, different waste management approaches are evaluated to determine the best method for reducing waste.

Partners: Missouri Department of Natural Resources.

Potential Implementation Tasks:

– Continue to train teachers with programs such as *Project Learning Tree* Secondary Module: Solid Waste Management.

3b. Educate students about individual responsibility for the wastes they generate, including pre-cycling or purchasing items that have less packaging or that use post-consumer recycled material in the packaging or in the product itself.

Current Programs: Currently there are a limited number of programs with a Total Recycling System. A Total Recycling System is one that involves all of the 3Rs and also includes the purchase of products made of recycled materials.

Partners: Missouri Department of Natural Resources and high school teachers.

Potential Implementation Tasks:

– Develop High School Module to address the Total Recycling System. This module will provide information that explains the entire recycling loop and encourages waste reduction, reuse, recycling and environmentally sound purchasing.

3c. Educate students about the importance of adopting a lifestyle based on the efficient and sustainable use of resources, in order to achieve a sustainable society.

Current Programs and Activities: National Geographic Standards address the use of resources relative to sustainability.

Partners: Missouri Department of Natural Resources, Missouri Environmental Education Association and teachers.

Potential Implementation Tasks:

– Continue to encourage the use of solid waste case studies and models such as the Investigating and Evaluating Environmental Issues and Actions Solid Waste Case Study; Organics Module and food waste issues.

Objective 4: College and University students should have the opportunity to learn about solid waste management through a variety of course offerings or through direct experience.

Actions

4a. Modify the core requirement for natural and social sciences to include a course that meets established guidelines for environmental literacy.

Current Programs and Activities: Missouri Waste Control Coalition Scholarship Program. The coalition established this scholarship for students who have an interest in or are focusing on classes in the environmental studies field. While not modifying core requirements to establish guidelines for environmental literacy, the scholarship provides an incentive for students to consider environmental issues while pursuing a college degree.

Partners: Missouri Department of Elementary and Secondary Education, Coordinating Board for Higher Education and University administrators.

Potential Implementation Tasks:

- Use established standards for environmental education, such as the North American Association for Environmental Education Guidelines for Excellence, to develop core requirements in environmental science and studies.
- Lieberman: *Using the Environment as an Integrating Context for Learning*.

4b. Promote Green Campus policies that help get staff and students alike into the habit of recycling while setting a positive example for transfer to society in general.

Current Programs and Activities: Staff and students team up to develop recycling policies and implement recycling programs on campus and at on-campus events.

Partners: Colleges and Universities statewide and the College and University Recycling Council of the National Recycling Coalition.

Potential Implementation Tasks:

- Implement strategies for on-campus waste management that are described in A. A. Smith's, *Campus Ecology* and J. Keniry's *Ecodemia*.

4c. Teacher education programs should incorporate a course in environmental education methods for undergraduates and promote interdisciplinary degree programs.

Current Programs and Activities: Environmental Education materials such as Project WILD, Project WET and Project Learning Tree are often incorporated in science methods courses for pre-service teachers.

Partners: Coordinating Board for Higher Education, statewide project coordinators, College and University Teacher Education Programs.

Potential Implementation Tasks:

- Promote to the greatest extent possible the University of Wisconsin Steven's Point on-line course, *Fundamentals of Environmental Education,* which has been developed to address this need.

Non-Formal Education

Solid waste management is a major social issue that needs to be understood by concerned citizens everywhere. Expertise needs to be available through a wide variety of sources including presentations, courses and workshops for in-service teachers, interest groups, stakeholders and others in a position to share and promote awareness and understanding of solid waste issues.

Objective 1: Workshops on solid waste management issues need to be made available to in-service teachers to provide them with expertise and experiences they can directly use in their classrooms.

Actions

1a. Government agencies such as the Missouri Department of Natural Resources offer solid waste workshops to in-service teachers or assist others in doing so.

Current Programs and Activities: Conference presentations (e.g., Missouri Waste Control Coalition, Interface) and Environmental Education credit workshops for teachers.

Partners: Missouri Department of Elementary and Secondary Education and the Missouri Department of Natural Resources.

Potential Implementation Tasks:

- Resource Management Institutes are being developed through the department's Environmental Assistance Office and will promote teacher education programs.

1b. Educational providers should design their services to meet the needs of teachers who wish to help their students learn about local environmental issues such as solid waste management.

Current Programs and Activities: Several larger cities, including Springfield and St. Charles, have solid waste programs and environmental education staff who can serve as models for this action. Solid waste management districts have also provided curriculum and teaching materials and conducted presentations to schools in their areas.

Partners: Missouri Department of Natural Resources, local governments and Solid Waste Management Districts.

Potential Implementation Tasks:

- Research and develop continuing professional development opportunities for educators. The Missouri Environmental Education Association certification calls for an accumulation of hours of direct instruction, field experiences and classroom applications.

1c. State and local solid waste agencies should work together to determine how to reach schools to provide experiences that otherwise would not be available to teachers and their students.

Current Programs and Activities: Information and presentations are often provided to local schools by solid waste management district representatives.

Partners: Solid Waste Management Districts, local governments and the Missouri Department of Natural Resources.

Potential Implementation Tasks:
- Identify needs and coordinate efforts to improve delivery of programs through all solid waste management districts.

Objective 2: Citizens should be able to participate in available hearings, meetings and workshops that provide solid waste information and address solid waste issues.

Actions

2a. Train community leaders to educate others about integrated waste management practices.

Current Programs and Activities: Environmental Management Institutes.

Partners: Missouri Department of Natural Resources, local governments and Solid Waste Management Districts.

Potential Implementation Tasks:
- Continue to promote Resource Management Institutes for community leaders.
- Encourage the Missouri Recycling Association and the Missouri Waste Control Coalition to develop workshops for community leaders at their annual conferences.

2b. Promote the purchasing of recycled products and the concept of a total recycling system.

Current Programs and Activities: The Missouri Market Development Program, administered by the Environmental Improvement and Energy Resources Authority, produces a recycled products guide annually.

Partners: Missouri Department of Natural Resources, Missouri Market Development Program, Missouri Recycling Association, Solid Waste Management Districts, recycled-content product manufacturers and retail sales businesses.

Potential Implementation Tasks:

– Work with partners to promote recycled-content purchasing through the media and at appropriate community events.

2c. Promote solid waste management awareness through community education programs.

Current Programs and Activities: Cleanup programs and local issues, public hearings, information sources, Mid-America Regional Council and Bridging the Gap.

Partners: Missouri Department of Natural Resources, Missouri Department of Conservation, Missouri Department of Transportation, Solid Waste Management Districts, community programs and Gateway Center for Resource Efficiency.

Potential Implementation Tasks:

– Work with partners to develop and distribute education modules suitable for community education programs.
– Promote local opportunities for community involvement in solid waste issues through programs established by partners.

Objective 3: Provide information that enables consumers to participate fully and effectively in management practices that reduce wastes.

Actions

3a. Increase local awareness of opportunities and responsibilities for waste reduction and recycling.

Current Programs and Activities: The Solid Waste Management Program Web site provides a map showing the locations of landfills and transfer stations, and recycling facility information is provided by assessment inventory information submitted biannually by the solid waste management districts.

Partners: Missouri Department of Natural Resources, Solid Waste Management Districts, local governments, solid waste industry and solid waste organizations.

Potential Implementation Tasks:

– Strategic planning or stakeholder meetings.
– Public meetings and hearings for input on improvement of programs.

3b. Use the media and public ad campaigns to promote the 3Rs, waste-to-energy and the concept of integrated waste management.

Current Programs and Activities: Press releases; contributing articles for Reduce, Reuse, Recycle column in monthly Conservation Federation of Missouri's *Missouri Wildlife* newsletter.

Partners: Missouri Department of Natural Resources, Conservation Federation of Missouri, newspapers, radio, television and other media for mass communication.

Potential Implementation Tasks:

- Continue to contribute articles for ongoing column.
- Advertise technical bulletins available through the Missouri Department of Natural Resources.

3c. Provide opportunities for consumers to get involved in determining costs, implementing new practices, or to provide input on special topics such as reduced packaging.

Current Programs and Activities: Public Opinion Surveys and needs assessment; waste composition study.

Partners: Missouri Department of Natural Resources, Missouri Market Development Program, local governments and solid waste industry.

Potential Implementation Tasks:

- Provide incentives and a level of understanding people will need to change their behaviors.

Management Training

Local to statewide managers, technicians, business executives and those in a position to develop and operate solid waste management facilities must have a thorough understanding of solid waste issues and be able to provide the leadership and decision-making skills needed to effectively implement the best possible collection and disposal options. In addition to the following actions, many related actions may be found in Managing Waste as a Resource.

Objective 1: Technicians and Administrators – Provide training which addresses the specific skills and decision-making abilities that elected officials and business and manufacturing leaders must have to make solid waste management possible.

Actions

1a. Administer and share results of constituent surveys to foster communication between consumers and management personnel.

Current Programs and Activities: Open meetings, conferences and outreach activity.

Partners: Missouri Department of Natural Resources and Solid Waste Management Districts.

Potential Implementation Tasks:
- Continue to provide stakeholders with up-to-date information.

1b. Inform constituents to involve them in the decision-making process.

Current Programs and Activities: Post issue review on Web site.

Partners: Missouri Department of Natural Resources and local governments.

Potential Implementation Tasks:
- Strive to make information available to public in a timely manner.

1c. Require training for solid waste managers in landfill management, collection options and other aspects of managing solid waste.

Current Programs and Activities: Updates and training sessions for landfill operators. Solid Waste Technician Certification.

Partners: Missouri Department of Natural Resources, Missouri Waste Control Coalition, Solid Waste Association of North America and solid waste industry.

Potential Implementation Tasks:

– Review changes in law or regulations training updates.

Objective 2: Business and Manufacturers - Businesses and manufacturers, representing the front-end production of the life cycle of various products, should fully understand what they can do to reduce waste, use less packaging and make durable products.

Actions

2a. Provide training to manufacturers about life-cycle analysis and how managing waste as a resource can be an asset rather than a cost.

Current Programs and Activities: Encourage Environmental Management Systems.

Partners: Missouri Department of Natural Resources, Missouri Recycling Association, business, industry and their organizations.

Potential Implementation Tasks:

– Assist manufacturers with waste audits and methods for decreasing the amounts of waste generated.

2b. State agencies should provide opportunities to update business leaders on waste issues and best available practices for reaching reduction goals.

Current Programs and Activities: Journals, professional conferences, status quo procedures.

Partners: Missouri Department of Natural Resources, Missouri Recycling Association, business, industry and their organizations.

Potential Implementation Tasks:

– Government should set example by endorsing environmentally responsible practices.

B. Managing Waste as a Resource

For most of the twentieth century, changes in the management of solid waste focused on ensuring that safe methods of disposal were used. To prevent pollution and disease, laws and regulations were aimed at improving the siting, design and operation of disposal facilities. Although alternatives to disposal – reuse, recycling, composting – were practiced by some individuals and communities, these practices became the focus of change as the century came to a close. Much of this interest was initially driven by concern over the availability of disposal capacity. However, it quickly became clear that using alternatives to disposal resulted in the added environmental benefit of conserving raw materials and energy. In the twenty-first century it is time to strengthen the management of waste as a resource.

To plan for programs and services that address solid waste, it is important to consider the source of the waste. For example, solid waste from households will be somewhat different than solid waste generated by restaurants and other commercial establishments. Solid waste services for households may be provided by a city, either directly or through a contract, but services for businesses are usually provided by private businesses. From a planning perspective, it is important to consider differences in waste composition, decision-making processes and infrastructure needs. For this reason, the department worked with five stakeholder groups: residential, institutional, construction and demolition, commercial and industrial solid waste.

The actions outlined in this section of the plan have been organized into six categories:

All Generators – actions that are broad in scope and will have a positive influence on every type of solid waste generator.

Residential Solid Waste – actions that mainly target solid waste originating from private single-family or multiple family dwellings. The materials may include paper, cardboard, beverage and food cans, plastics, food wastes, glass containers, old clothes, yard wastes, furniture and appliances.

Institutional Solid Waste – actions that address waste materials originating in institutional facilities, such as government offices, schools, hospitals, nursing homes, correctional facilities, research institutions and public buildings. The materials may include packaging materials, food wastes, disposable products, office waste and other materials related to the institution's mission.

Commercial and Industrial Solid Waste – actions that focus on solid wastes generated by businesses. Businesses described as commercial activities would include offices, stores, retail and wholesale outlets, office buildings, markets, theaters and restaurants. Industrial solid waste includes all nonhazardous materials discarded from industrial operations or derived from industrial operations or manufacturing processes. These could also include small quantities of waste generated from cafeterias, offices, or retail sales departments on the same premises. Industrial waste may include wastes generated by activities such as agricultural operations, wholesale trade and mining.

Construction and Demolition Solid Waste – actions that are aimed at discarded materials resulting from the construction, remodeling, repair, or demolition of buildings, bridges, pavements and similar structures.

Recycling Market Development – actions that are designed to create and improve markets for materials collected for recycling. Recycling market development is key to sustaining the recycling efforts of all types of generators.

Organic Solid Waste – actions for managing the organic waste stream as a resource. Organic materials make up approximately 56 percent of the solid waste that Missourians discard in landfills and are part of each of the waste streams described above. These materials include paper products, food residuals, textiles, wood and yard waste. Organic materials are valuable resources and have great potential for reuse, recycling and energy recovery.

All Generators

Objective 1: Provide incentives that encourage the safe and environmentally sound management of all types of solid waste, minimizing disposal and maximizing resource conservation.

Actions

1a. Provide recognition programs for waste reduction, recycling, composting and other alternatives to disposal.

Current Programs and Activities: Efforts to minimize waste and recover resources are recognized annually by the Governor, the Missouri Recycling Association, the Missouri Waste Control Coalition and many of the solid waste management districts, as well as several other state and national organizations (Appendix H). The Solid Waste Management Program, Missouri Market Development Program and Outreach and Assistance Center help promote many of these awards, often assisting in the nomination or review process.

Partners: Missouri Department of Natural Resources, Missouri Recycling Association, Missouri Waste Control Coalition, National Recycling Coalition, U.S. Environmental Protection Agency, Solid Waste Association of North America, Choose Environmental Excellence, Solid Waste Management Districts, Environmental Education Association, business organizations, government organizations and environmental organizations.

Potential Implementation Tasks:

- Increase efforts by the department and its partners to expand awareness of these recognition opportunities for businesses, local governments and service organizations.
- Encourage business and government organizations to add environmental awards to their existing recognition programs.

1b. Provide tax incentives for recycling collection, recycling research and development, development of new recycled products, co-collection systems and waste-to-energy projects.

Current Programs and Activities: Missouri law (Section 144.030.2, RSMo) allows a tax exemption for equipment used in material recovery facilities. This section of the law also exempts machinery and equipment used directly in the manufacturing process if used in one of the following manners: plant expansion, new plant, design change or ingredient or component part. Although this exemption is available to all manufacturers, recycled product manufacturers can take advantage of it as well.

Partners: Missouri Department of Natural Resources, Missouri Market Development Program, Missouri Office of Administration, General Assembly, Governor and business organizations.

Potential Implementation Tasks:

- Convene an advisory group with representatives of the appropriate partners to investigate additional tax exemptions aimed at increasing resource recovery.
- Work with partners to increase awareness of the existing tax exemptions.

1c. Encourage the use of deposits for beverage containers to increase recycling of aluminum cans, plastic bottles and glass bottles.

Current Programs and Activities: Currently there are no container deposit laws in Missouri. Legislators have made proposals for this type of program, but have not been successful in getting them passed. To provide guidance to the Governor's office, the legislature and the general public, the department regularly researches this topic. For any deposit legislation, it is important to evaluate how the system will affect the existing recycling infrastructure, since aluminum cans have traditionally provided reliable revenue to both public and private recycling centers.

Partners: Missouri Department of Natural Resources, General Assembly, Governor, business associations and solid waste and recycling organizations.

Potential Implementation Tasks:

- Continue to research feasibility of a container deposit law for Missouri. The Iowa Beverage Container Deposit Law is a good model to consider.
- Convene a work group with partners to determine what the barriers and opportunities are for using deposits to increase container recovery.

Objective 2: Provide financial assistance for programs and activities designed to reduce, reuse, recycle, compost or recover energy from solid waste.

Actions

2a. Direct grants and other financial assistance toward projects which meet the greatest needs of Missouri's waste reduction infrastructure. This would include reuse, recycling, composting and waste to energy projects. Funds should be provided for recycling start-ups or venture businesses, and technical research and development.

Current Programs and Activities: State Project Grants, District Grants and Missouri Market Development Program financial assistance were established in 1990 to help create or expand alternatives to disposal. This assistance has been provided to both public and private entities engaged in a wide variety of activities: recycling collection services; research and development; solid waste audits; yard waste processing; and waste diversion technical assistance. In 2005, legislation removed the State Project Grants but did not effect the funding opportunities from District Grants or the Missouri Market Development Program.

Partners: Missouri Department of Natural Resources, Missouri Market Development Program, Target Advisory Committee, Solid Waste Management Districts and solid waste organizations.

Potential Implementation Tasks:

- Work with the solid waste management districts and the Missouri Market Development Program to target gaps in Missouri's waste reduction and recycling infrastructure.
- Work with districts, the Missouri Market Development Program and other partners to evaluate the greatest needs for new programs or services.

2b. Garner venture capital from the private sector to help create a commercially viable recycling industry.

Current Programs and Activities: Through a partnership with the Mid-America Council of Recycling Officials, the U.S. Environmental Protection Agency's Jobs Through Recycling program held an investment forum to which several Missouri businesses were invited. The forum brought together potential investors with recycling entrepreneurs with the goal of bringing private investment into the recycling business arena.

Partners: Missouri Department of Natural Resources, Missouri Recycling Association, Mid-America Council of Recycling Officials, U.S. Environmental Protection Agency, recycling industry, business and industry and their organizations.

Potential Implementation Tasks:

- Work with partners to find new opportunities for private investment in recycling and other waste diversion activities.
- Work with U.S. Environmental Protection Agency and other partners to bring additional recycling investment forums to the Midwest region.

2c. Use federal funds for technical research of alternatives to disposal.

Current Programs and Activities: The department has not pursued the use of federal funds specifically for this purpose. In general, funds from federal agencies have been limited in scope.

Partners: U.S. Environmental Protection Agency, U.S. Department of Agriculture, U.S. Department of Energy, National Science Foundation, Missouri Market Development Program and numerous stakeholders.

Potential Implementation Tasks:

- Research the availability of federal and private foundation funds for waste diversion technical research.
- Work with partners to ensure that information regarding the availability of these funds is widely disseminated.

Objective 3: Provide technical assistance to citizens, local governments, non-profit organizations, institutions and businesses in order to assist them in reducing solid waste at the source and using alternatives to disposal.

Actions

3a. Create solid waste management cross-department databases, including available solid waste services, financial assistance and other resources.

Current Programs and Activities: The department's Solid Waste Management Program maintains lists of many solid waste and recycling services, primarily based on permitted facility information and biennial service inventories submitted by the solid waste management districts. The information from the solid waste management districts focuses on services for residential waste. The Missouri Market Development Program publishes a directory of recycled products and markets for recovered materials.

The department's Outreach and Assistance Office has compiled a List of Assistance Providers, which includes a wide range of public and private environmental services. For the last several years, the State Recycling Coordinator, housed in the Office of Administration's Division of Purchasing and Materials Management, has maintained a list of environmentally preferable products, including recycled content items, available on state contract. These products can be easily purchased by state offices, political subdivisions and quasi-public governmental bodies through the Cooperative Procurement Program.

Partners: Missouri Recycling Association, Missouri Department of Natural Resources, other state agencies, recyclers, consultants, business organizations and solid waste organizations.

Potential Implementation Tasks:

- Convene a work group with partners to determine what information is needed to have a more complete inventory of solid waste recovery information, including types and amounts of materials recovered.
- Work with partners to provide assistance to recycling centers in locating and securing markets for collected material.
- Continue to gather residential service information from the solid waste management districts.
- Develop lists of solid waste recovery opportunities for other types of generators: institutional, commercial, industrial, construction and demolition.
- Develop lists of financial assistance opportunities available to each type of generator and distribute to each.
- Work with the department's Outreach and Assistance Center to ensure that the List of Assistance Providers includes comprehensive solid waste information.
- Develop Web sites which present the full range of solid waste assistance for each major category of solid waste generator. The Missouri's Business Information Source Resource Library, maintained by the University of Missouri Outreach and Extension, provides an excellent model. (www.missouribusiness.net/library.asp)

3b. Provide model contracts for solid waste services that provide dollar incentives for waste reduction and recycling.

Current Programs and Activities: The department's Solid Waste Management Program has conducted research into model contracts in response to specific requests.

Partners: Missouri Department of Natural Resources, U.S. Environmental Protection Agency, local governments, Missouri Recycling Association, Missouri Waste Control Coalition and solid waste industry.

Potential Implementation Tasks:

- Work with partners to compile model contracts currently in use, and to develop new models where necessary. Take advantage of research already completed by the U.S. Environmental Protection Agency and others in areas such as Resource Management, Less is More, and Pay-As-You-Throw.
- Conduct outreach activities to distribute these where needed. Use the existing information networks, such as business or government journals, to promote this resource.

3c. Promote model programs and best practices.

Current Programs and Activities: In 1991, the department's Solid Waste Management Program published the Model Plan Guidelines for Comprehensive Solid Waste Management. The Model Plan provided technical guidance for planning a range of programs: waste prevention, reuse, recycling, composting, education and disposal. Although aimed primarily at helping the newly created solid waste management districts with regional planning, the Model Plan also was distributed to cities and counties to help local decision-makers.

Two editions of the Decision Makers' Guide to Solid Waste Management have been published by the U.S. Environmental Protection Agency, the most recent in 1995. This guide covers the full range of solid waste management options, from source reduction to landfill siting. The U.S. Environmental Protection Agency has also developed guides for individuals, businesses and schools.

Several organizations, research institutes and agencies in other states have developed excellent guidance for solid waste management. The National Recycling Coalition, Solid Waste Association of North America and the Institute for Local Self Reliance are just a sample of the sources for assistance on how to reduce waste and ensure its safe disposal.

The department primarily distributes this type of guidance in response to specific requests or at conferences and other public venues.

Partners: Missouri Department of Natural Resources, Missouri Recycling Association, Missouri Waste Control Coalition, U.S. Environmental Protection Association, Solid Waste Association of North America, National Recycling Coalition, Association of State Territorial Solid Waste Management Officials and solid waste, recycling, business and service organizations.

Potential Implementation Tasks:

- Expand efforts to compile information and guidance on best practices in solid waste management. Revise the Model Plan Guidelines for Comprehensive Solid Waste Management.
- Work with partners to develop effective methods of distributing this information to each type of solid waste generator.
- Work with partners to create a Peer-to-Peer match program, similar to the Association of State Territorial Solid Waste Management Officials' Comprehensive Environmental Response, Compensation and Liability Act Program Peer Match Directory. This comprehensive directory contains contacts in states and territories possessing expertise in various Comprehensive Environmental Response, Compensation and Liability Act Program areas.

3d. Promote the use of waste audits to help design and evaluate programs.

Current Programs and Activities: In the comprehensive planning guidance developed by the department, solid waste audits are recommended to help both public and private facilities identify opportunities for waste prevention and resource recovery. In this context, the term waste audit is used to describe a process of evaluating the amounts and types of solid waste generated and the purchasing practices which impact waste generation and management.

District Grants and State Project Grants have been directed at solid waste audits for businesses, organizations, schools, correctional facilities and universities across the state. Through this process, recommendations can be made for reducing waste at the source and for recycling, composting or waste-to-energy programs.

The department's Environmental Assistance Office's On-site Assessment Team provides environmental compliance and pollution prevention assistance to small business owners, farmers, local governments and the general public on ways to control or reduce wastes. The team can help facilities identify compliance issues, develop a pollution prevention plan, identify energy conservation opportunities, optimize manufacturing processes, and identify recycling opportunities.

To evaluate solid waste management for the state as a whole, solid waste characterization studies were conducted in the late 1990s with the support of State Project Grant funds (Appendix D). This information has been key to establishing priorities for financial assistance and policy development for the state.

Partners: Missouri Department of Natural Resources, Missouri Market Development Program, Missouri Recycling Association, Missouri Waste Control Coalition, business organizations, government organizations and the Missouri Office of Administration.

Potential Implementation Tasks:

- Increase efforts to promote the use of solid waste audits.
- Work with partners to create affordable technical assistance for waste audits.
- Work with partners to create a train-the-trainer program for each type of waste generator.

Residential Solid Waste

Objective 1: Increase source reduction and reuse of residential waste.

Actions

1a. Create or expand community source reduction programs.

Current Programs and Activities: National and state trends indicate that the amount of municipal solid waste generated will continue to rise. The U.S. Environmental Protection Agency estimates that by 2010, Americans will generate more than 4.8 pounds per person per day. In response to this trend, the Source Reduction Forum of the National Recycling Coalition has produced Making Source Reduction and Reuse Work in Your Community: A Manual for Local Governments.

The Forum designed this guide for local solid waste managers, recycling coordinators, elected officials, policy makers and interested citizens. Drawing upon the experience of more than 90 communities, the report includes a discussion of lessons learned, how-to strategies and 22 case studies of the most innovative and effective local government source reduction programs around the country. The department has promoted this approach by placing source reduction at the top of Missouri's Integrated Waste Management Hierarchy. To encourage local programs, the department distributes this and other similar guidance materials.

Partners: Missouri Department of Natural Resources, local governments, Regional Planning Commissions and Solid Waste Management Districts.

Potential Implementation Tasks:
- Develop more proactive methods for distributing guidance documents.
- Work with partners to create appropriate grant targets for District Grants and other funding opporunities.
- Include in training programs for local governments.

1b. Create new reuse programs and promote existing opportunities.

Current Programs and Activities: Traditional reuse activities can be found across the state: Salvation Army Stores, Goodwill Stores, flea markets, yard sales, thrift shops. Some local libraries collect used books, some charities focus on collecting specific materials, such as shoes or toys. The department includes reuse in its guidance for local solid waste planning. The department also promotes reuse by distributing fact sheets and brochures addressing this topic.

State Project Grants and District Grants have provided support for these types of programs. Examples include the city of Independence Reuse Workshop Project to collect bicycles, appliances, furniture, lawn equipment or electronics and the city of Lemay Bulk Waste Project to collect bulky items for reuse by local organizations.

Partners: Missouri Department of Natural Resources, Solid Waste Management Districts, Missouri Recycling Association, Missouri Waste Control Coalition, civic organizations and volunteer networks.

Potential Implementation Tasks:

- Compile information on reuse opportunities across the state and develop effective method of distribution.
- Conduct research to develop comprehensive guidance for local development of reuse programs. Take advantage of the resources available through the Reuse Development Organization, a national non-profit organization promoting reuse on every level.
- Encourage civic and service organizations to conduct special collections for non-traditional reusables, such as eyeglasses, cell phones and athletic shoes.

Objective 2: Increase the number of communities using unit or volume-based solid waste collection systems, Pay-as-You-Throw, to create financial incentives for waste reduction and resource recovery.

Actions

2a. Provide technical assistance to help create or expand Pay-as-You-Throw solid waste collection systems.

Current Programs and Activities: The department has supported Pay-as-You-Throw as an excellent way to increase recovery and decrease disposal of residential waste. Efforts to promote this concept have included providing information on request and funding grant projects designed to increase Pay-As-You-Throw systems. Through one of the State Project Grants, a tool kit was developed to assist Missouri communities in planning and implementation of a Pay-As-You-Throw system.

The Water and Environmental Program of the U.S. Department of Agriculture has made grants available to nonprofit organizations to provide technical assistance and training to assist rural communities with their solid waste problems. Two organizations in Missouri have received these grants, the Midwest Assistance Program and Associated Recyclers of the Midwest.

Partners: Missouri Department of Natural Resources, Missouri Recycling Association, Missouri Waste Control Coalition, Solid Waste Association of North America and the U.S. Environmental Protection Agency.

Potential Implementation Tasks:

- Work with partners to determine what the obstacles are for adopting Pay-As-You-Throw programs in Missouri.
- Work with partners to create full cost accounting and Pay-As-You-Throw training for local governments.
- With input from private haulers, develop outreach and training for adopting Pay-As-You-Throw by private service providers.
- Conduct research to determine additional resources, like the U.S. Department of Agriculture's program, which may be available to Missouri communities.

2b. Provide financial assistance to help create or expand Pay-As-You-Throw solid waste collection systems.

Current Programs and Activities: Through State Project Grants and Solid Waste Management District Grants, a few communities have been given financial assistance to help establish Pay-As-You-Throw systems. There is no ongoing program directed specifically at this effort.

Partners: U.S. Environmental Protection Agency, Missouri Department of Natural Resources, Solid Waste Management Districts, local governments, Target Advisory Committee, public and private haulers.

Potential Implementation Tasks:

- Work with partners to create appropriate grant targets for District Grants.
- Conduct research to determine if additional financial resources are available.

Objective 3: Maximize recycling collection opportunities and ensure that residential recycling programs are sustainable.

Actions

3a. Provide technical assistance to create, expand and improve residential recycling programs.

Current Programs and Activities: Beginning with the development of the Model Plan Guidelines for Comprehensive Solid Waste Management, the department has provided guidance to cities, counties and solid waste districts for planning residential recycling programs. The department's Environmental Management Institute has included recycling in many of the sessions aimed at local environmental managers.

Missouri communities have also benefited from training conducted by the Missouri Recycling Association, the Missouri Waste Control Coalition and the Missouri Chapter of the Solid Waste Association of North America. Technical assistance for residential recycling has been a major focus for solid waste management districts.

Partners: Missouri Department of Natural Resources, Missouri Recycling Association, Missouri Waste Control Coalition, Solid Waste Association of North

America, U.S. Environmental Protection Agency, local governments, Solid Waste Management Districts, residential haulers and recycling managers.

Potential Implementation Tasks:

- Work with public and private haulers to determine what types of technical assistance are needed.
- Research and compile technical information and guidance materials, taking advantage of sources such as the Local Government Environmental Assistance Network and Institute for Local Self Reliance.
- Continue to work with partners to sponsor training programs such as Solid Waste Association of North America's Collection Efficiencies: Getting More For Less.
- Develop a peer-to-peer match program for local governments in Missouri to share their expertise.
- Promote volunteer networks to help staff recycling drop-off centers, or to conduct special collections for non-traditional recyclables, such as textiles, computer disks and polystyrene loose fill packaging.

3b. Provide financial assistance for communities and private haulers to help create, expand and improve recycling collection services for residential waste. Place greater emphasis on projects designed to improve efficiency and ensure sustainability.

Current Programs and Activities: A large portion of the funding available from State Project Grants and District Grants has been directed toward residential recycling programs. The types of projects have included equipment procurement, constructing buildings for recycling centers and promotional campaigns.

The U.S. Department of Agriculture's Water and Environmental Program provides loans, grants and loan guarantees for solid waste (as well as drinking water, sanitary sewer and storm drainage) facilities in rural areas and cities and towns of 10,000 or less.

Partners: Missouri Department of Natural Resources, Solid Waste Management Districts, Missouri Recycling Association, Missouri Waste Control Coalition, U.S. Environmental Protection Agency and the U.S. Department of Agriculture.

Potential Implementation Tasks:

- Conduct research and survey haulers and recycling managers to determine where financial assistance should be targeted.
- Garner input from partners to develop grant target recommendations for District Grants.
- Conduct research to determine if additional financial resources are available.

Institutional Solid Waste

Objective 1: State and local governments provide leadership through their policies and practices for managing the solid waste they generate.

Actions

1a. Adopt comprehensive waste reduction policies.

Current Programs and Activities: For state government, waste reduction policies were first addressed by the Missouri Policy for Resource Recovery in May of 1989. Later that same year, House Bill 438, et al, created statutory requirements for state agency recycling and waste reduction policies (Section 34.032.5, RSMo). The Missouri Inter-departmental Committee on Waste Reduction and Resource Recovery was formed and a policy adopted in December 1989 (Appendix G).

While many cities and counties have adopted waste reduction policies, a comprehensive list of these is not available.

Partners: Missouri Office of Administration, Missouri Department of Natural Resources, Environmental Improvement and Energy Resources Authority, Missouri Interagency Recycling Committee, Legislature, local governments, Missouri Municipal League and the Missouri Association of Counties.

Potential Implementation Tasks:

- Work with partners to review state policies for managing solid waste generated at state facilities. Include policies for procurement and budgeting.
- Survey local governments to determine which cities and counties have policies in place and what areas the policies address.
- Work with partners to compile or develop model procurement policies and contracts for state and local governments. The Local Government Environmental Assistance Network is one source for this type of technical information.

1b. Evaluate current waste reduction programs.

Current Programs and Activities: Each year the State Recycling Coordinator works with the Missouri Interagency Recycling Committee members and Environmental Improvement and Energy Resources Authority to produce the State of Missouri Recycling and Waste Reduction Report. This report gives the status of recycling programs in state offices and establishes goals for the following year. Information in the report includes the amounts and types of materials collected for recycling, source reduction efforts and procurement of recycled content products.

The State Recycling Coordinator has conducted waste sorts at several facilities to help evaluate their waste reduction programs. Additionally, presentations were made to Missouri Office of Administration managers regarding the types and amounts of waste at state facilities and tips for waste reduction and cost savings.

While an evaluation process may be a component of waste reduction programs in local governments, this information is not available at a statewide level. Several facilities have benefited from waste audits funded by State Project Grants or District Grants.

Partners: Missouri Office of Administration, Missouri Department of Natural Resources, Environmental Improvement and Energy Resources Authority, Missouri Interagency Recycling Committee, Governor, Legislature, local governments and Solid Waste Management Districts.

Potential Implementation Tasks:
- Expand waste audits for state and local government facilities.
- Work with partners to provide guidance for waste reduction program review, including the procurement process.
- Investigate other sources of financial or technical resources available for state or local governments.

1c. Create or expand source reduction, reuse, recycling, composting and waste-to-energy programs for government facilities.

Current Programs and Activities: House Bill 438, et al, also created requirements for recycling collection programs in state offices. Collection programs for offices located in Jefferson City were immediately implemented and have been adopted in out-state locations where local services are available. Examples include state parks and the department's regional offices.

In addition to recycling collection, a comprehensive waste reduction program should address source reduction, reuse, composting and recycling market development. The Missouri State Agency for Surplus Property provides reuse opportunities for state and other public agencies in Missouri. These include cities, counties, schools and public health facilities. The Missouri State Agency for Surplus Property manages discarded furniture, supplies and equipment from both state and federal sources in Missouri.

The Department of Corrections has been making great progress in adding food waste composting programs to their waste reduction efforts. In several cases, they have received support from State Project Grants or District Grants.

Although several local government facilities have received financial assistance for waste reduction programs from State Project Grants or District Grants, more comprehensive information is needed to determine the number or type of programs at the local level.

Partners: Missouri Office of Administration, Missouri Department of Natural Resources, Environmental Improvement and Energy Resources Authority, Missouri Interagency Recycling Committee, Legislature, local governments, Solid Waste Management Districts, Missouri Recycling Association.

Potential Implementation Tasks:

- Continue partnership between the Missouri Department of Natural Resources, Office of Administration and Missouri Interagency Recycling Committee to further develop recycling programs for state offices.
- Provide guidance and technical assistance for source reduction programs for state and local governments.
- Create work groups from appropriate state or local agencies to improve surplus programs.
- Provide guidance for procurement programs which incorporate waste management principles.

1d. Increase awareness of accomplishments in waste reduction.

Current Programs and Activities: The annual State of Missouri Recycling and Waste Reduction Report provides the type of information needed, but distribution is primarily within state government. Recently the Office of Administration's State Recycling Coordinator conducted a series of media presentations throughout the state via radio and public broadcast systems, courtesy of the Department of Mental Health. The Office of Administration's State Recycling Coordinator has also set up information displays at a number of conferences held in the state.

There are a variety of ways that local programs are promoted: cities and counties may produce annual reports; information may be provided directly to local media; or activities may be highlighted in newsletters produced by solid waste management districts, Missouri Recycling Association, Choose Environmental Excellence chapters or other environmental organizations.

Partners: Missouri Office of Administration, Missouri Department of Natural Resources, Environmental Improvement and Energy Resources Authority, Missouri Interagency Recycling Committee, Legislature, local governments, Choose Environmental Excellence and the media.

Potential Implementation Tasks:

- Work with the Missouri Interagency Recycling Committee to improve reporting of waste reduction accomplishments.
- Work with the State Recycling Coordinator and public information staff to promote government activities.
- Encourage government office participation in Earth Day and other environmental events open to the public.
- Work with partners to include information about government waste reduction activities in their newsletters.

Objective 2: Institutions of all types maximize their waste reduction, reuse and recycling.

Actions

2a. Evaluate programs in place for major types of institutions: health care, correctional, research facilities or other similar facilities.

Current Programs and Activities: Although waste audit projects have been funded through both State Project Grants and District Grants, these involved a relatively small number of institutional facilities statewide. Better information is needed to fully evaluate the number and level of programs in place.

Partners: Missouri Office of Administration, Missouri Department of Natural Resources, public and private institutions, Missouri Recycling Association and Solid Waste Management Districts.

Potential Implementation Tasks:

- Use surveys to compile general information on programs in the institutional sector.
- Work with partners to develop teams which can provide comprehensive program reviews.
- Provide training for waste audits to evaluate current programs and find opportunities to increase diversion.
- Work with solid waste management districts to develop appropriate grant targets for District Grants.

2b. Provide technical assistance to create, expand or improve waste reduction programs that complement or enhance the institution's primary mission.

Current Programs and Activities: Guidance material is available from the EPA, the department, the National Recycling Association and other state and local sources. This material may be distributed upon request, or at meetings and conferences. The On-site Assessment Team, a service of the department's Environmental Assistance Office, has provided direct technical assistance to several institutional facilities (see also Action 3d under All Generators).

The solid waste management districts and the Missouri Recycling Association have also provided assistance in this area. State Project Grants and District Grants have been used to purchase equipment and supplies, provide training or conduct planning activities.

Some institutional organizations have been very active in providing assistance. One example is Hospitals for a Healthy Environment. Hospitals for a Healthy Environment is a national voluntary program designed to help health care facilities enhance work place safety, reduce waste and waste disposal costs and become better environmental stewards and neighbors. Hospitals for a Healthy Environment

is a joint project of the American Hospital Association, the EPA, Health Care Without Harm and the American Nurses Association.

Partners: Office of Administration, Missouri Department of Natural Resources, Environmental Improvement and Energy Resources Authority, Missouri Interagency Recycling Committee, Missouri Recycling Association, Missouri Waste Control Coalition, public and private institutions and institutional organizations.

Potential Implementation Tasks:

- Continue to research best practices for each major category of institution: government offices, residential facilities, health care facilities, correctional facilities and educational facilities. The California approach to waste reduction in schools provides a good model. They seek to develop programs where academics, administration, and facilities work collaboratively to incorporate resource conservation and sustainability into their organizational philosophy, planning, and implementation.
- Compile or develop guidance customized for each category.
- Work with partners to provide train-the-trainer workshops at meetings and conferences of institutions and their respective organizations.
- Use existing institutional manager networks to disseminate information and guidance.
- Work with solid waste management districts to develop appropriate grant targets for District Grants.

2c. Increase the reuse of institutional waste.

Current Programs and Activities: Institutions have access to publicly and privately operated waste exchanges. These include the Industrial Material Exchange Program, operated by the Illinois Environmental Protection Agency, and Industry Online Central, operated by Haz Waste, Inc.

Some institutions, such as schools and colleges, can take advantage of many of the services offered by the Missouri State Agency for Surplus Property.

The department has promoted the use of waste exchanges as part of an integrated waste management program. Guidance and informational materials are distributed upon request. This topic has also been promoted in conferences held by the Missouri Recycling Association and the Missouri Waste Control Coalition.

Partners: Missouri Office of Administration, Missouri Department of Natural Resources, Environmental Improvement and Energy Resources Authority, Missouri Interagency Recycling Committee, Missouri Recycling Association, Missouri Waste Control Coalition, Missouri State Agency for Surplus Property, public and private institutions and institutional organizations.

Potential Implementation Tasks:

- Research and compile information about successful institutional reuse programs in Missouri or other states.
- Provide information on existing waste exchange programs which will accept materials from institutions. Examples include the Surplus Exchange in Kansas City which accepts furniture and electronic equipment and the Sabre Foundation's Book Donation program which distributes books to libraries, universities, schools and similar institutions in more than 60 countries.
- Work with solid waste management districts to develop appropriate grant targets for District Grants.

Commercial and Industrial Solid Waste

Objective 1: Business and government adopt product stewardship policies and goals.

Actions

1a. Promote product stewardship concepts and principles.

Current Programs and Activities: According to the U.S. Environmental Protection Agency (EPA), product stewardship is "a product-centered approach to environmental protection...(which) calls on those in the product life cycle – manufacturers, retailers, users, and disposers – to share responsibility for reducing the environmental impacts of products."

The department's efforts to support product stewardship have been primarily through its participation in national and regional initiatives. The department's Solid Waste Management Program staff participated in the National Electronic Products Stewardship Institute, joining nine other state solid waste officials in the group. Other participants included EPA, local governments, industry representatives and environmental organizations. The National Electronic Products Stewardship Institute was created to bring stakeholders together to develop solutions to the issue of electronic products management. Their efforts will be discussed further in the Special Solid Waste Issues section of the plan.

The department's Solid Waste Management Program and the Missouri Market Development Program represent Missouri on the Mid-America Council of Recycling Officials. The Mid-America Council of Recycling Officials' members collaborate to develop regionally effective programs and policies in recycling, recycling market development, and source reduction. The Mid-America Council of Recycling Officials is involved in a number of product stewardship activities. It is a member of the National Plastics Redesign Project, a design for recycling project. It also supports the efforts of the Midwestern Workgroup on Carpet Recycling and the Multi-Client Recycled Plastic Lumber Project, providing funds for the final testing of six ASTM standards for the lumber.

Several businesses in Missouri have joined organizations such as Choose Environmental Excellence, Missouri Recycling Association, and the EPA's WasteWise program, showing their support for a range of environmental issues. Information on product stewardship is distributed by the department, the Missouri Market Development Program and solid waste management districts.

Partners: Missouri Department of Natural Resources, Missouri Market Development Program, Solid Waste Management Districts, Missouri Recycling Association, Choose Environmental Excellence, U.S. Environmental Protection Agency, University of Missouri Outreach and Extension, industries and industry organizations, retailers and retail organizations.

Potential Implementation Tasks:

- Continue support of national and regional efforts to promote product stewardship.
- Work with University of Missouri Outreach and Extension to add product stewardship information to the Missouri Business Development Network.
- Work with partners to develop successful promotional campaigns.
- Promote membership in Choose Environmental Excellence, Missouri Recycling Association, EPA WasteWise and other organizations that promote environmental stewardship.
- Encourage Missouri industries to participate in the EPA Design for the Environment Program, a government-industry partnership that seeks to incorporate environmental considerations into the design and redesign of products, processes and technical and management systems.

1b. Facilitate process of stakeholder input for policy and goal development.

Current Programs and Activities: Facilitated groups have played a key role in developing solid waste legislation, regulations and in the planning process. Examples include the Senate Bill 60 Rulemaking Advisory Group, the Public Participation Work Group, the Waste Tire Advisory Committee and the state plan stakeholder groups.

To ensure that State Project Grants supported Missouri's most critical infrastructure needs, the Target Grants Committee was established in 2000. Membership included representatives from solid waste management districts and both public and private entities involved in waste reduction, recycling and waste collection. The Target Advisory Committee worked closely with Solid Waste Management Program staff to develop the type and scope of projects eligible for funding in each grant cycle.

As described in the plan introduction, the plan stakeholder input process included both commercial and industrial stakeholder groups. Participants in both groups expressed support for continuing the process of facilitated discussion.

Partners: Missouri Department of Natural Resources, Missouri Market Development Program, Solid Waste Management Districts, Missouri Recycling Association, Choose Environmental Excellence, U.S. Environmental Protection Agency, University of Missouri Outreach and Extension, industries and industry organizations, retailers and retail organizations, consumers, Governor and legislators.

Potential Implementation Tasks:

- Compile or develop technical information which addresses stewardship of both products and packaging. Include the Less is More materials developed by the Midwest Assistance Program with the support of a State Project Grant.
- Work with partners to develop forums for policy discussion.
- Work with environmental and business organizations to integrate product stewardship into their conference and meeting agendas.
- Work with partners to obtain legislative consideration of product stewardship policies where appropriate.
- Encourage grant targets which will help sponsor stakeholder training.
- Investigate sources of funding that will enable business and government representatives to attend training in solid waste management policy.

Objective 2: Promote the establishment or expansion of waste-based businesses to increase waste diversion and enhance economic development.

Actions

2a. Research the impact of waste-based businesses on Missouri's economy.

Current Programs and Activities: The U.S. Recycling Economic Information Study was commissioned by the EPA and a number of states through a cooperative agreement with the National Recycling Coalition. The national study was accomplished through a comprehensive analysis of both existing economic data and reasonable estimates based on targeted surveys of recycling businesses and sophisticated economic modeling. The study allows for sound economic comparisons across different regions and states in the country and establishes an important benchmark of the economic impact of recycling and reuse.

The St. Louis-Jefferson Solid Waste Management District funded the St. Louis Metropolitan Area Recycling Economic Information Study through a District Grant to the University of Missouri. Modeled after the national study, this project evaluated the size and scope of the recycling, remanufacturing and reuse industries in the St. Louis Metropolitan Area.

Through the combined efforts of the department and the Missouri Market Development Program, funding was recently awarded to the University of Missouri to conduct a similar study for the state of Missouri. The project will evaluate and analyze the economic impacts of the waste reduction, reuse, and recycling industry statewide. This information will help to promote awareness of recycling and reuse. It will also help evaluate the current recycling infrastructure and indicate areas needing improvement.

Partners: Missouri Department of Natural Resources, Missouri Market Development Program, Solid Waste Management Districts, Missouri Department of Economic Development, reuse and recycling service providers.

Potential Implementation Tasks:

- Develop promotional materials based on the results of the Missouri study.
- Encourage additional research by universities and research centers.

2b. Promote industrial development that creates by-product synergy.

Current Programs and Activities: The United States Business Council for Sustainable Development describes by-product synergy as "creating and capturing value through matching producers of under-valued waste streams with users, and working with regulators to establish support for the process. By-product synergy promotes a shift from a waste disposal system to a reuse methodology, saving energy and cutting emissions."

By-product synergy projects have been implemented in multiple states, as well as in Mexico and Canada. The most significant effort to date in Missouri was initiated by the Mid-America Regional Council Solid Waste Management District. The district's first step involved working with Andy Mangan of the United States Business Council for Sustainable Development and a team of consultants to determine the feasibility of launching a BPS project in the Kansas City region. The feasibility study concluded that private and public sector leaders support the implementation of a yearlong project. The project team includes the Environmental Excellence Business Network, Mr. Mangan, the Elements consulting division of BNIM Architects, Franklin Associates and Bridging the Gap.

The implementation project will be led by Environmental Excellence Business Network's recruitment of ten diverse companies as fee-paying participants and engage local, state and federal government agencies for support. Through extensive collaboration, individual companies will work together as a cross-industry team focused on turning every by-product into valuable new products. The synergies uncovered are expected to produce added revenues and cost savings, new business opportunities, and environmental and regulatory benefits to the group and to the region as a whole. Efforts are underway to secure project funding.

Partners: Missouri Department of Natural Resources, Missouri Market Development Program, Solid Waste Management Districts, Missouri Recycling Association, Choose Environmental Excellence, U.S. Environmental Protection Agency, University of Missouri Outreach and Extension, Missouri Department of Economic Development, U.S. Business Council for Sustainable Development, industries and industry organizations.

Potential Implementation Tasks:

- Compile or develop technical information to help promote by-product synergy.
- Work with partners to help create networking opportunities between potential industry partners.
- Promote the efforts of the Mid America Regional Council Solid Waste Management District and others creating by-product synergy partnerships.

- Work with partners to develop data bases which provide the by-product information needed to match generators with users, while addressing confidentiality concerns.
- Foster dialogue between developers and local governments to promote the establishment of eco-industrial parks that create new by-product synergies.

2c. Increase the use of existing reuse and recycling services by commercial and industrial generators.

Current Programs and Activities: The department, the Missouri Market Development Program and solid waste management districts regularly distribute information about reuse or recycling opportunities. This includes local recycling centers, waste exchanges, reuse centers and recycling end markets. By increasing our outreach efforts, more business waste will be recovered and reuse and recycling services will become more viable.

State Project Grants have funded waste audits to identify materials that can be reused or recycled, and projects to implement audit recommendations. Similar projects have been funded in several solid waste management districts.

Partners: United States Business Council for Sustainable Development, Missouri Market Development Program, Solid Waste Management Districts, Missouri Recycling Association, University of Missouri Outreach and Extension, Missouri Department of Economic Development, business and industry and supporting organizations, reuse and recycling service providers.

Potential Implementation Tasks:
- Work with state officials and agencies to develop an in-kind gift receipt for donations of discarded materials to non-profit organizations. The federal government uses a process that could serve as a model.
- Work with reuse and recycling service providers to improve the marketing of their services to the commercial and industrial sectors.
- Encourage research and development of processes needed for waste streams not previously managed through recycling.
- Work with partners to facilitate waste prevention and recycling at large entertainment venues. Assistance with establishing these programs is available from the National Association for PET Container Resources.

Construction and Demolition Solid Waste

Objective 1: Prevent solid waste through reuse of buildings.

Actions

1a. Promote building reuse and historic preservation.

Current Programs and Activities: The department's State Historic Preservation Office is responsible, in partnership with the U.S. Department of the Interior's National Park Service and local governments, for carrying out the mandates of the *National Historic Preservation Act* in Missouri. The State Historic Preservation Office works with citizens and groups throughout the state to identify, evaluate and protect Missouri's diverse range of historic, architectural and archaeological resources. Promoting historic preservation is a key component of the State Historic Preservation Office's efforts.

In addition to preserving structures with historic significance, it is important to reuse any empty or abandoned buildings whenever feasible. One example of this is the Missouri State Penitentiary in Jefferson City. The Missouri Office of Administration's Division of Design and Construction approached the American Institute of Architects - Missouri in 1998, asking for assistance in creating a plan for reuse of the historic prison. In the spring of 2000, a design charrette was held in Jefferson City to set goals and criteria for the redevelopment plan. In addition to state officials and staff, a Task Force including local civic and business leaders participated. Following the charrette, the Task Force assisted with selection of a principal planning consultant. An initial plan was developed and should proceed when funding is secured.

Partners: United States Business Council for Sustainable Development, Solid Waste Management Districts, Missouri Office of Administration, Missouri Recycling Association, U.S. Green Building Council, State Historical Society, American Institute of Architects chapters, local governments, architects, construction businesses and organizations and builders.

Potential Implementation Tasks:

- Continue to promote historic preservation, including the contribution it makes to solid waste management in Missouri.
- Work with partners to develop promotional materials for building reuse.
- Work with media and partners to disseminate promotional materials effectively.

1b. Provide technical and financial assistance for building reuse and historic preservation.

Current Programs and Activities: The State Historic Preservation Office provides educational, technical and financial assistance for preservation and rehabilitation projects. Financial assistance includes federal matching grants, state and federal rehabilitation tax credits and the state Historic Preservation Revolving Loan Fund.

Certified Local Governments are an important part of the federal-state-local preservation partnership. The State Historic Preservation Office assists municipal and county governments in achieving certification and provides intensive training in the preservation of local resources to local historic preservation commissions.

The American Institute of Architects' Committee on the Environment works to sustain and improve the environment by advancing and disseminating environmental knowledge and values, and advocating the best design practices to integrate built and natural systems. Missouri hosts a state and three local chapters of the American Institute of Architects that have been active in promoting these concepts.

Partners: United States Business Council for Sustainable Development, Solid Waste Management Districts, Missouri Office of Administration, Missouri Recycling Association, U.S. Green Building Council, State Historical Society, American Institute of Architects chapters, local governments, architects, construction businesses and organizations and builders.

Potential Implementation Tasks:

- Conduct research on building reuse programs and compile or develop informational materials.
- Work with local governments, architects and builders to incorporate building reuse into community planning and development. The Rocky Mountain Institute has several guidance documents on its Web site, including Framework for Community Sustainability, Ten Ingredients for Long-Term Success.
- Research the availability of state, federal and private sources of financial assistance.

Objective 2: Reduce waste and increase recovery in construction and demolition processes.

Actions

2a. Promote waste reduction as part of the green building concept.

Current Programs and Activities: Sustainable or green building practices can reduce the tremendous impact that building design, construction and maintenance has on both people and nature. According to the U.S. Department of Energy's Center for Sustainable Development, buildings consume 40 percent of the world's

total energy, 25 percent of its wood harvest and 16 percent of its water. The building industry is the nation's largest manufacturing activity, representing more than 50 percent of the nation's wealth and 13 percent of its Gross Domestic Product. Energy and material consumption in buildings can contribute significantly to global climate change.

Sustainable building practices go beyond energy and water conservation to incorporate environmentally sensitive site planning, resource-efficient building materials and superior indoor environmental quality. The department has embraced this concept and occupies the first green building for state employees in Jefferson City, the Lewis and Clark State Office Bulding. This project represents a collaboration of department staff and administrators, elected officials, Office of Administration's Division of Design and Construction and a team of design experts. The new building's siting, design and operation is designed to minimize its impact on the environment by incorporating features: a location within the Missouri State Penitentiary Redevelopment site; building placement that is oriented to maximize daylighting of the interior and take advantage of passive solar heating; rain water collection and water-saving fixtures throughout the structure; high efficiency heating and air conditioning systems; and the use of materials with a high recycled content.

The EarthWays Home in St. Louis is a handsome Victorian residence, built in 1885, which was renovated in 1994 to preserve the building and to demonstrate environmentally sensitive building options. The EarthWays Home demonstrates practical, affordable and easily accessible ways homeowners and companies can cut resource consumption and reduce waste in building improvement and operation. Recycling features include indoor and outdoor composting systems and many examples of household products and furnishing made from recycled and sustainably produced material. Through tours and other activities, the home serves as an educational tool for green building techniques.

Partners: Missouri Office of Administration, Missouri Department of Natural Resources, Solid Waste Management Districts, Missouri Recycling Association, U.S. Green Building Council, U.S. Environmental Protection Agency, American Institute of Architects chapters, construction and demolition businesses and organizations.

Potential Implementation Tasks:

- Continue to promote green building concepts, including the success of the department's new office building.
- Work with partners to develop green building display materials.
- Create an information summary to highlight available incentives, guidance materials and collection options.
- Research and compile technical information on the latest technology.
- Compile lists of green building projects in Missouri to highlight their success.

2b. Expand processing of construction and demolition waste to increase resource recovery while protecting the environment.

Current Programs and Activities: There have been several attempts to establish collection and processing sites for construction and demolition waste in Missouri. To encourage this activity, Missouri regulations were revised in 1997 to allow a permit exemption for this activity. In some cases the projects have been successful, but some have resulted in large piles of materials which could not be marketed and numerous nuisance complaints. Although department staff can provide technical assistance to help prevent these problems, this help is not always sought. New efforts are needed to help make these projects successful.

Partners: Missouri Office of Administration, Missouri Department of Natural Resources, Solid Waste Management Districts, Missouri Recycling Association, Missouri Waste Control Coalition, U.S. Green Building Council, American Institute of Architects chapters, construction and demolition businesses, organizations and recyclers.

Potential Implementation Tasks:

- Compile or develop guidelines for construction and demolition waste processing.
- Work with partners to determine how best to get information to the appropriate audience.
- Work with partners to fund research and development to ensure marketability of processed materials.
- Work with local governments to ensure that local ordinances and policies support these activities while maintaining adequate protections.

2c. Promote and increase reuse opportunities for construction and demolition waste.

Current Programs and Activities: For many construction materials, the best way to manage discards is through reuse. Research has shown that during new construction, remodeling or demolition, significant quantities of usable materials are discarded. One of the most successful efforts to collect these materials is the Habitat ReStores. These stores sell quality used and surplus building materials, with proceeds going to fund the construction of houses by local Habitat for Humanity chapters.

All materials sold by Habitat ReStores were donated for that purpose, often from contractors with excess supplies, from demolition crews salvaging reusable materials, or from the general public. Habitat's most successful ReStores raise enough to build ten or more houses per year and divert thousands of tons of usable materials from disposal. Currently there are five ReStores operating in Missouri.

The annual Missouri Recycling Association conferences have included sessions on construction and demolition waste management, including the practice of deconstruction. Through deconstruction, buildings are selectively and

systematically disassembled, generating materials for reuse. Benefits go beyond the recovery of materials to include the creation of jobs and job skills.

Partners: Missouri Office of Administration, Missouri Department of Natural Resources, Solid Waste Management Districts, Missouri Recycling Association, Missouri Waste Control Coalition, U.S. Green Building Council, U.S. Environmental Protection Agency, American Institute of Architects chapters, construction and demolition businesses and organizations.

Potential Implementation Tasks:

- Compile information and guidance on deconstruction and other similar techniques.
- Work with partners to provide deconstruction training.
- Work with state and local governments to address construction and demolition debris reuse in their policies and procedures.
- Promote the donation of materials to available outlets.
- Encourage the establishment of reuse centers where needed.

Recycling Market Development

The purpose of recycling market development is to increase the use of recovered materials in the manufacture of products. The use of recyclable materials by industries as feedstocks results in the efficient use of Missouri's resources in Missouri manufacturing, job creation and energy conservation.

Objective 1: Create new markets and strengthen existing markets for recovered materials in Missouri.

Actions

1a. Promote the purchasing of recycled-content products by individuals, businesses, institutions and government offices.

Current Programs and Activities:

- RSMo 34.032 and 34.031 describe standards for certain recycled-content purchases for state government.
- The Missouri Market Development Program distributes a directory of recycled content products and provides marketing assistance.
- The Missouri Market Development Program offers buy-recycled procurement training to governments, businesses and organizations.
- The Office of Administration's Division of Purchasing maintains a list of environmentally preferable products available on statewide contract.
- The Office of Administration coordinates a cooperative purchasing program for local government entities.
- The Office of Administration coordinates the Missouri Interagency Recycling Committee that shares information about buying recycled in state government.
- The National Recycling Coalition established the Buy Recycled Business Alliance, a group of organizations committed to increasing the procurement of recycled content products through education and leadership by example.
- Solid Waste Management District Grants

Partners: Missouri Department of Natural Resources, Missouri Market Development Program, Solid Waste Management Districts, Missouri Recycling Association, National Recycling Coalition, Missouri Office of Administration, Chambers of Commerce, business organizations, Missouri Department of Economic Development, University of Missouri Outreach and Extension.

Potential Implementation Tasks:

- Public awareness; information and training designed for specific audiences: business, institutions, local government; marketing assistance for Missouri recycled products.
- Development of a Missouri recycled product manufacturers network to promote recycled-content products.
- Determine whether there are types of recycled-content products currently unavailable for which there exists consumer interest.

- Assess consumer and manufacturer perceptions about recycled-content products in order to design strategies to increase purchase.
- Develop and implement a large-scale Missouri Recycled Product Promotion effort similar to Department of Agriculture program for Missouri products.
- Expand or develop new cooperative purchasing programs for recycled-content products.
- Revise building codes and standards to permit an increase in the use of recycled materials in construction.
- Develop and implement demonstration projects including recycled-content products.
- Expand the Department of Economic Development's Web-based Missouri Marketplace to include the ability to search for recycled-content products.
- Develop alliances with merchants to promote recycled-content products in stores.
- Conduct an annual Missouri Recycled Products Trade Show similar to the California model.

1b. Create financial and other incentives for market development and publicity.

Current Programs and Activities:
- The Missouri Market Development Program provides financial assistance to recycled-content product manufacturers and to processors of recyclable material.
- The Solid Waste Management District Grants may provide opportunities for market development financial assistance.

Partners: Missouri Market Development Program, Missouri Department of Natural Resources, Missouri Department of Economic Development, Solid Waste Management Districts, and industrial and commercial organizations.

Potential Implementation Tasks:
- Assess actual capital gaps in market development financing to determine appropriate financial incentives.
- Identify and develop appropriate incentives for research and development, materials and product testing.
- Develop and implement outreach and education to investment community to encourage investment in manufacturing businesses that use recovered materials as feedstocks.
- Develop a range of financing opportunities for recycled product manufacturers, possibly including: tax-exempt bond financing, equity financing, royalty financing, and low-cost loans.

1c. Conduct periodic review of recyclable material(s) marketability.

Current Programs and Activities: Missouri Market Development Program technical assistance is available to evaluate specific material marketability in relation to proposed or existing manufacturing ventures.

Partners: Missouri Market Development Program, Missouri Department of Natural Resources, Missouri Department of Economic Development, Missouri Recycling Association, University of Missouri Outreach and Extension, Solid Waste Management Districts and recyclable materials processors and brokers.

Potential Implementation Tasks:

- Develop material monitoring procedures and performance indicators.
- Conduct and distribute a quarterly review of general recycling material trends.
- Review and provide an annual report regarding specific recyclable materials.
- Develop opportunities for increased communication between various market components and stakeholders.
- Evaluate the possibility of tying financial incentives to market monitoring and reporting requirements.
- Utilize geographic information system capabilities to provide information about materials activity.

1d. Develop local end-use markets.

Current Programs and Activities: Primarily accomplished through grant-funded projects and technical assistance upon request.

- The Missouri Market Development Program offers financial and technical assistance to support local end use market development.
- The Solid Waste Management District Grants may be available to support local end use market development.
- The Kansas City Byproduct Synergy Initiative is a large-scale project intending to match local waste streams with users.
- The Missouri Market Development Program distributes the Industrial Materials Exchange Service's directory.
- Some start-up waste exchanges are underway in Missouri.

Partners: Missouri Market Development Program, Missouri Department of Natural Resources, Missouri Department of Economic Development and local economic development organizations, Solid Waste Management Districts, local governments, businesses, University of Missouri Outreach and Extension and Missouri Enterprises.

Potential Implementation Tasks:

- Promote financial assistance currently available; promote technology transfer of viable local end-use options.
- Provide financial assistance specifically targeted to local markets.
- Evaluate specific local market feasibility for material markets.
- Integrate solid waste planning with local community planning and eco-industrial planning to encourage development of recycling related business.
- Track material flows in specific communities and regions, identify materials in specific local areas with significant potential for increased diversion, and identify additional factors such as job pool, siting that provide opportunities for local market development to facilitate planning for use of waste as feedstock.

- If successful, replicate Kansas City Byproduct Synergy effort in other areas of the state.
- Improve existing or develop new local waste exchange opportunities.
- Evaluate the possibility of providing community economic development grants tied to recycling-related businesses similar to the Massachusetts model.
- Consider development of waste-to-energy facilities based on local waste streams.

1e. Help manufacturers of recycled products adopt technologies or processes to help increase efficiency, productivity and profitability.

Current Programs and Activities: The Missouri Market Development Program provides technical assistance to businesses, government and organizations in a variety of areas. Through contracts with the University of Missouri Extension, field staff are available for both on-site assistance and research services.

Partners: Missouri Market Development Program, University of Missouri Outreach and Extension, Missouri Enterprises and recycled product manufacturers.

Potential Implementation Tasks:
- Determine and provide appropriate incentives and resources for recovered material manufacturing research and development.
- Provide resources for materials and product testing.
- Streamline permitting processes for recycled product manufacturers and material processors.
- Provide siting and permitting assistance to materials processors and recycled product manufacturers.
- Establish recyclable material or recycled product cooperatives to take advantage of cooperative market efficiencies.
- Develop standards and specifications for collected recyclable materials to support manufacturing efficiency, productivity and profitability.
- Provide in-facility workshops for manufacturers to assess opportunities for recycled product manufacturing.

1f. Create more recycled products.

Current Programs and Activities:
- The Missouri Market Development Program provides financial and technical assistance to support the development and manufacture of recycled-content products.
- The Solid Waste Management District Grants may be available to support the development and manufacturing of recycled-content products.

Partners: Missouri Market Development Program, Missouri Department of Natural Resources, Missouri Department of Economic Development, Solid Waste Management Districts and Missouri Enterprises.

Potential Implementation Tasks:

- Evaluate material-specific product development opportunities in Missouri by evaluating material flows and manufacturing capacity.
- Identify existing manufacturers that could convert to recovered material feedstock and provide information and incentives for them to do so.
- Provide additional resources for research into new uses for recovered materials.
- Increase the promotion of available resources and incentives to potential recycled-product manufacturers.
- Consider product stewardship initiatives as a means by which to encourage industry to recycle product materials into new products.

1g. Financial assistance to support end markets, for new market research and development, for advertising recycled products and for business subsidies to encourage use of recycling markets.

Current Programs and Activities:

- The Missouri Market Development Program provides financial and technical assistance to support recycled product manufacturing.
- The Solid Waste Management District Grants may be available to support market development.

Partners: Missouri Market Development Program, Missouri Department of Natural Resources, Solid Waste Management Districts, Missouri Enterprises and University of Missouri Outreach and Extension.

Potential Implementation Tasks:

- Identify specific capital investment gaps in order to address them effectively.
- Consider rebates for recycled-content product purchases to increase market prominence such as the Iowa compost model.
- Provide marketing assistance for manufacturers and distributors of recycled-content products.
- Consider tax or other incentives for manufacturers using recovered materials as feedstocks.
- Evaluate transportation networks to identify and correct inefficiencies in material flow.
- Consider regulatory requirements that support recycling markets such as landfill bans, bottle bills, material content specifications.
- Research the availability of other funding sources for recycling market development.

Organics in Solid Waste

Objective 1: Reduce a significant amount of the organic waste that is currently being disposed in landfills.

Actions

1a. Encourage programs and activities that reduce the amount of organic materials destined for landfills.

Current Programs and Activities: Source reduction or waste prevention of organics in solid waste is generally defined as reducing waste which enters the solid waste disposal or management system. More simply put, the waste remains and is managed on-site. The University Extension's Don't Bag It program is designed to reduce the amount of grass clippings by cutting grass higher. The program is designed to help homeowners save mowing time and money by not having to purchase bags or pay for yard waste removal. Along with mowing at a higher setting, other aspects of yard waste reduction options include planting native species that require less water and less fertilizer. Community programs that distribute home composting bins at little or no cost also effectively reduce the amount of yard waste that would otherwise need to be managed by a larger scale operation. The Missouri Department of Natural Resources also provides informational brochures on effective yard waste management.

Another type of waste prevention option for organic material is a food bank program. One organization, America's Second Harvest, has affiliates in Columbia, Kansas City, Sikeston, Springfield, St. Joseph and St. Louis. The Kansas City affiliate, Harvesters, serves as Kansas City's only food bank and has worked to feed the hungry in its community for over 20 years.

In 1997, the Missouri Department of Natural Resources' Solid Waste Management Program provided grant funding to Harvesters to purchase refrigeration units in two trucks to expand their ability to rescue and distribute prepared food that otherwise would otherwise have been sent to a landfill.

Partners: Missouri Department of Natural Resources, University of Missouri Outreach and Extension, food banks and participating municipalities.

Potential Implementation Tasks:

- Research and compile information about successful waste prevention programs.
- Continue to promote and endorse activities that reduce the amount of organic material generated.
- Promote the donation of materials to available outlets.

1b. Encourage programs and activities that divert organic materials from disposal in landfills through reuse.

Current Programs and Activities: For many organic materials, the optimum management method is through reuse. The Habitat for Humanity ReStores have demonstrated growing success in the reuse of many organic materials. Habitat for Humanity ReStores are building supply stores that accept and resell quality new and used building materials. ReStores generate funds to support Habitat's building programs, while reducing the amount of used materials that are headed for landfills.

The ReStores offer lumber, windows, doors, paint, hardware, tools, lighting fixtures and other items for sale to the public. Individuals also can donate reusable building materials such as the items listed above. Retailers and manufacturers can donate end-of-line, scratch-and-dent, discontinued inventory, paint mis-tint and customer returns to a ReStore and avoid the cost of returning them to the manufacturer. Habitat for Humanity ReStores located in Jefferson City, Kansas City, St. Louis and Springfield, Missouri have all been recipients of State Project Grants. (Also See: Construction and Demolition Solid Waste, Action 2c)

Partners: Missouri Department of Natural Resources, Missouri Market Development Program and Solid Waste Management Districts

Potential Implementation Tasks:
- Continue to promote and endorse activities that reuse waste destined for landfills.
- Promote the donation of materials to available outlets.
- Promote the establishment of reuse centers where needed.

Objective 2: Recover a significant amount of the organic waste that is currently being disposed in landfills.

Actions

2a. Encourage the effective recycling of organic materials from the waste stream.

Current Programs and Activities: Recycling organic materials can be a highly effective management option. This is especially true if there is a ready market for the organic material. In 1991, City of Springfield set out to attract businesses and industries to Springfield that use recycled materials in the manufacturing process.

As a result, CanBrands, now Nestle Purina PetCare, established a plant in Springfield to make cat litter out of old newsprint. CanBrands wanted a municipality or region that would ensure a stable, cheap supply of used newspaper. Meanwhile, Springfield wanted a company to recycle its 125 to150 tons of monthly newsprint. On April 21, 1999, CanBrands opened in Springfield. The company worked with the city to establish an educational program to encourage the residents to participate in paper recycling.

CanBrands received Waste Reduction and Recycling Grant funds in Fiscal Year 1996 and Fiscal Year 1997 for equipment, recycling containers and a transport vehicle to assist with packaging cat litter made from recycled newspaper. In June of 1999 and again in 2000, the Missouri Market Development Program provided market development grant funds to purchase equipment.

The Solid Waste Management District Grants are available for waste diversion and recovery programs. The Missouri Market Development Program also provides funding to assist with developing markets for products made from recovered materials.

Partners: Missouri Department of Natural Resources, Solid Waste Management Districts and Missouri Market Development Program.

Potential Implementation Tasks:

– Continue to endorse and promote programs that use recovered organic waste in the production of new products.

2b. Continue encouraging the use of composting to produce rich organic soil amendments from organic materials such as food residuals, wood waste and yard wastes.

Current Programs and Activities: Composting is considered an environmentally sound method of managing the many different forms of organic waste. Several composting systems including static piles, windrows and in-vessel are all viable composting methods. While composting may appear to be a straightforward operation, difficulties do arise in practice, especially in large-scale operations. Some of the major concerns that must be dealt with on larger sites include off-site discharge of water, odors, vector control, noise, litter, and fire prevention. No matter which composting system is implemented, it is essential that the program is well maintained and managed.

A well maintained and operated in-vessel composting system provides controls that address most problems associated with composting. Reeds Spring High School began operating a state-of-the-art in-vessel composting system in 2001. Along with other equipment, the system is expected to help the school district recycle its food and paper wastes.

The Missouri Department of Natural Resources provided a grant of $100,000 and the Southwest Missouri Solid Waste Management District provided a $15,000 grant toward the project. Since early January 2001, the in-vessel composter has been taking three feedings a week of the school district's 900 pounds-per-day generation of food wastes and 100 pounds per day of paper wastes. The compost is used in the high school's botany and greenhouse classes on campus and for various landscaping needs among the school district's buildings and grounds.

Partners: Missouri Department of Natural Resources, Solid Waste Management Districts, composting businesses, municipalities and institutions.

Potential Implementation Tasks:

- Continue to endorse and promote programs that compost organic waste.
- Conduct research on best management practices for compost sites and compile or develop informational materials.
- Compile list of composting facilities in Missouri to provide informational materials and highlight their successes.

2c. Develop and update information regarding composting for individuals, businesses and decision-makers.

Current Programs and Activities: Various brochures, fact sheets, technical bulletins and guide books have been developed by the Missouri Department of Natural Resources or with department resources.

Partners: Missouri Department of Natural Resources and University of Missouri Outreach and Extension, composting businesses and organizations.

Potential Implementation Tasks:

- Continue to provide up-to-date information regarding composting of organic materials.
- Research and compile composting information for individuals, businesses and decision-makers.

2d. Develop educational seminars and workshops regarding composting for individuals and businesses.

Current Programs and Activities: The Master Composter Program is a community education program about resource conservation through composting. Participants may receive as much as 40 hours of free training about home composting. Participants leave the training knowledgeable about yard waste composting and how to use the finished compost. In return for the training, Master Composters agree to share their knowledge and skills with others by volunteering their time to community outreach. Programs have been started in the greater St. Louis metropolitan area, Rolla, Branson, Springfield, Kansas City, Columbia and other places in the state.

Partners: Missouri Department of Natural Resources and University of Missouri Outreach and Extension, composting businesses and organizations.

Potential Implementation Tasks:

- Advertise the Master Composter Program as a community resource recovery educational program.
- Research and compile composting training opportunities.
- Encourage individuals, composting businesses, state and community decision-makers and solid waste managers and officials to attend training as opportunities become available.

2e. Encourage use of organic materials from municipal solid waste to produce energy when the organic materials cannot be reused, recycled or composted.

Current Programs and Activities: Northwest Missouri State University's Maryville, Missouri, power plant burns both wood waste and recycled paper to create steam that is used to cool and heat the entire campus rather than using natural gas.

The wood waste comes from various industries, such as sawmills and furniture manufacturers located within the northwest Missouri area. Recycled paper from both the campus and the city of Maryville is pelletized or condensed into chalk-sized bits before being burned at the power plant.

Partners: City of Maryville, Northwest Missouri State University, Missouri Department of Natural Resources, Solid Waste Management Districts, Missouri waste-to-energy facilities, colleges and universities.

Potential Implementation Tasks:

– Actively promote greater use of wood waste, paper waste and other organic waste in the production of energy.

2f. Encourage economically sustainable capture and use of methane gas in Missouri landfills.

Current Programs and Activities: Methane is collected from the Fred Weber Inc. landfill to provide heat to the Pattonville High School. The Pattonville Project started officially in January 1997. It is expected to save the district $30,000 annually (at 1997 natural gas prices) and provide heat for the school for at least 40 years.

A 3,200-foot pipeline takes the gas to the school property. At no cost, Fred Weber, Inc. provided the first 2,000 feet to the school. The final 1,200 feet of pipeline and converting the school boiler to methane use cost the school district $150,000. A two percent loan from the Department of Natural Resources and a $25,000 grant from
St. Louis County covered this cost.

Gas is collected through a series of perforated pipes that extend from the surface to near the bottom of the landfill. The interconnected grid of pipes is then connected to a blower system that provides the gas directly to the school. A garlic odor is injected to alert people to possible leaks. The gas itself does not need to be upgraded for use.

Partners: Pattonville High School, Fred Weber Landfill, St. Louis County, Missouri Department of Natural Resources, Missouri sanitary landfill owners and operators, local governments and institutions and Solid Waste Management Districts.

Potential Implementation Tasks:

- Assess opportunities to establish economically sustainable methane gas collection systems at Missouri landfills, and assist in the creation of economically sustainable landfill methane projects in Missouri.
- Provide technical information and assistance to landfill operators who wish to explore opportunities to capture methane gas for energy use.
- Help landfill gas-to-energy developers find financing, apply for state and federal grants, and assist in understanding options and requirements in state and federal regulations.
- Consider providing financial incentives to help initiate projects that have long-term technical and economic viability.
- Promote landfill methods that facilitate future waste recovery and methane capture.
- Support the U.S. Environmental Protection Agency's Landfill Methane Outreach Program, a voluntary assistance and partnership program that helps facilitate and promote the use of landfill gas as a renewable energy source. The Landfill Methane Outreach Program builds partnerships between state agencies, industry, energy service providers, local communities and other stakeholders.

C. Safe Disposal Practices

Managing waste as a resource places the emphasis on alternatives to disposal. Environmentally protective disposal facilities are still needed for materials that cannot be realistically managed except through disposal. We are challenged to protect our communities and environment by ensuring that waste that cannot be managed any other way goes to a permitted landfill or processing center and not into a ditch or sinkhole.

Meeting this challenge involves a combination of tactics. By ensuring that landfills and processing centers are sited, designed, constructed and operated according to federal and state standards, the potential for negative environmental impacts is greatly reduced. When permitted facilities fail to follow the requirements, enforcement action may be taken. Enforcement also is needed to stop those who illegally dump, burn or otherwise handle solid waste in ways that cause pollution. It is our goal to ultimately get the facility back into compliance through education and persuasion. Penalties and litigation are only used when it is necessary to level the playing field for those who are managing waste properly. No one should get an economic advantage by doing things wrong.

States like Missouri with U.S. Environmental Protection Agency-approved permitting programs designed to meet certain protective requirements can provide disposal facility owners and operators additional flexibility in permitting such as location, design, operation, corrective action, closure and post-closure care and financial assurance. This flexibility helps to hold down costs for private and public solid waste services, which helps to control disposal costs for our citizens. By keeping these costs down, illegal dumping behavior is less widespread.

Infectious waste is also regulated in Missouri and includes needles, body tissue, organs, body parts and body fluids from hospitals and clinics who treat patients infected with diseases such as Hepatitis B, Hepatitis C and HIV. Processing permit applications are reviewed and issued for infectious waste facilities to ensure this waste is properly handled and accidental exposure does not occur.

Some older landfills have not been properly closed and the responsible party is either deceased, gone or does not have the resources to properly close the facility. The department is attempting to properly close them in order to reduce any environmental risks and health hazards associated with the facility. Several owners of closed landfills have requested and received our approval to use closed landfills as golf courses, shooting ranges, equipment-storage sites or radio tower locations.

Standards for disposal facilities have evolved throughout the twentieth century. Staff maintains technical knowledge through research to evaluate the advantages and disadvantages of practices like bioreactor landfills, landfill mining and plasma arc technology as time and resources allow.

In addition to those activities integral to the processing and issuance of permits for the various solid waste facilities and ensuring that all requirements are met through enforcement, the following objectives have been identified as important or essential to the activities the agency carries out in support of safe disposal practices.

Permitted Facilities

The department's Solid Waste Management Program issues permits for construction and operation of new facilities and modification and expansion of existing facilities. The department also regularly inspects and provides technical assistance and necessary enforcement to these facilities. This oversight helps to ensure that facilities are built and operated in a manner that does not present a nuisance and is protective of human health and the environment.

Permitted facilities are those disposal areas and processing facilities that must comply with requirements contained in the Missouri Solid Waste Management Law and Regulations. A solid waste disposal area is any area used for disposal of solid waste from more than one residence or one or more commercial, industrial, manufacturing, recreational or governmental operation. Permitted disposal areas include sanitary landfills, demolition landfills, utility waste landfills and special waste landfills. These landfills employ an engineered method of disposing of solid wastes on land in a manner that minimizes environmental hazards.

Siting a landfill is a complex and lengthy process. Permit applicants must take into consideration economics, local ordinances, geography, geology, hydrology and climate when making siting decisions. As well, neighborhood resistance to a proposed site may develop at anytime before, during, or after the permitting process.

The department's Geological Survey Program provides oversight and approval of investigations of the soils, geology and hydrogeology for proposed sites, an important feature of the landfill siting process. This includes looking for geologic structures such as faults and sinkholes. This step is important in that it helps ensure that waste is isolated from aquifers where people obtain their drinking water.

Currently active are twenty-four sanitary landfills, four demolition landfills, five utility waste landfills and three special waste landfills.

Processing facilities are those facilities where solid wastes are salvaged and processed. They include transfer stations, some incinerators, and material recovery facilities. Currently active permitted processing facilities in Missouri include forty-seven transfer stations, three infectious waste processing facilities, three material recovery facilities, and one composting facility.

Objective 1: Promote alternative waste disposal and management.

Actions

1a. Encourage energy use plans in landfill permits.

Current Programs and Activities: Although the department has no authority to mandate energy use plans, landfills are encouraged to recover methane for energy wherever practical. The expiration of federal tax credits for methane recovery

remains a big obstacle towards further development of these resources. For further information, please see Organics in Solid Waste, Objective 2, Action 2f.

Partners: Missouri Department of Natural Resources, U.S. Environmental Protection Agency and regulated community.

Potential Implementation Tasks:
- Include energy recovery guidance in the department's Solid Waste Technician Certification classes.
- Encourage the Missouri Waste Control Coalition, Solid Waste Association of North America and other organizations to include sessions on energy recovery at their annual conference.

1b. Promote waste collection services in areas not presently served by collection services such as green boxes.

Current Programs and Activities: Private haulers serve the majority of the unincorporated areas in rural Missouri. Due to the low population densities or road conditions in some of these areas, curbside solid waste collection is not available to all rural residents. Unfortunately, this increases the occurrence of people using their own – or a neighbor's – property to dump their waste. One way to address this issue is for the hauler to place a large container, or green box, in a location that is easily accessible to several residents and the hauler.

In 1997, Missouri's solid waste regulations were revised to remove all regulatory obstacles to the use of green boxes. This allows these centralized drop-off locations to operate without the burden of unnecessary regulation.

Partners: Missouri Department of Natural Resources, solid waste haulers, local governments and Solid Waste Management Districts.

Potential Implementation Tasks:
- Provide information and technical guidance for setting up green box systems.
- Encourage local governments and solid waste management districts to work with private haulers to provide this service to their residents.

1c. Promote siting of more construction and demolition landfills.

Current Programs and Activities: The agency does not have the authority to promote the siting of facilities; we can only evaluate applications as they are submitted to us. Free-market principles dictate the types and locations of proposed facilities.

Partners: Missouri Department of Natural Resources, regulated community and Solid Waste Management Districts.

1d. Streamline regulations and permitting process to more easily use by-products and resources.

Current Programs and Activities: Current law and regulations exempt recovered materials from regulation as a solid waste. This avoids the need for permits or other approvals when utilizing these resources, as long as they are handled in a manner that will not create a public nuisance or adversely affect the public health. The requirements for the beneficial reuse of solid wastes have already been streamlined to a significant degree for a number of high-volume waste streams, most notably fly ash and cement kiln dust.

Partners: Missouri Department of Natural Resources, industries and industry organizations and environmental organizations.

Potential Implementation Tasks:

- Survey industries to determine the regulatory barriers.
- Work with partners to develop proposals for regulatory revisions that increase resource recovery while protecting the environment.

New Technologies

New technologies for solid waste management are being developed continuously. The department continues to work with stakeholders to assess the effectiveness of these new technologies in areas such as methane gas recovery, bioreactor landfilling, and landfill mining, to name a few.

Objective 1: Pave the way to new, cleaner, safer, and more cost-efficient methods of managing solid waste in Missouri.

Actions

1a. Research and develop lower cost alternatives for landfill mining.

Current Programs and Activities: The department does not have the resources necessary to conduct such activities. Research conducted elsewhere is available from the EPA's Technology Innovation Program.

Partners: Missouri Department of Natural Resources, U.S. Environmental Protection Agency, solid waste industry, universities and other research centers.

Potential Implementation Tasks:

- Compile available research results and make this information available to landfills in Missouri.
- Encourage the solid waste industry, universities and other appropriate research centers to conduct research into this and other methods of recovering resources from landfills.

1b. Research and develop innovative ways to properly close and maintain old landfills that do not have financial assurance instruments.

Current Programs and Activities: The department's Solid Waste Management Program has designed and overseen several landfill closures with an emphasis on minimal post-closure care. While all aspects of the design may not have met current statutory and regulatory design, the actions taken have resulted in significant improvements to localized environmental impacts.

One example is the wetlands leachate treatment at the JZ Demolition Landfill near Wright City, Missouri. This treatment system, designed and constructed for approximately $100,000, has resulted in contaminant reductions of 50 percent or more since it became operational. There are essentially no ongoing operation and maintenance costs; conventional treatment, such as pumping and hauling to a treatment plant, would have expended the entire post-closure fund after approximately two years. The wetland has been in place for three years, and has a virtually limitless lifespan.

The Solid Waste Management Program was awarded a grant from EPA to close a landfill near Lamar, Missouri. The landfill leachate and sediment were discharging into a tributary of an impaired waterway. The closure was successful and will require only minor maintenance. Another landfill in north-central Missouri was closed with oversight of the court and the Solid Waste Management Program allowing one of the responsible parties, using an inadequate financial assurance instrument, to contract for the design of and all labor for proper closure of the landfill. There is some money left for post-closure maintenance.

Partners: Missouri Department of Natural Resources, Missouri Department of Conservation, U.S. Fish and Wildlife Service, University of Missouri - Rolla, Extension Center, Local Soil Conservation Districts, Judicial System and Contractors.

Potential Implementation Tasks: If future funds become available, there are a number of possible research projects that could be pursued. Among the most promising are alternative cap designs utilizing plants that uptake leachate and filter out toxics (phytoremediation) to control and treat leachate. Solid Waste Management Program staff is continuously looking for innovative ways to close these old landfills properly.

1c. Design future landfills as planned resource recovery facilities.

Current Programs and Activities: The EPA sets the minimum standards for landfill design, allowing specific areas of flexibility for states that have a EPA-approved permitting program. Significant changes will have to be made to federal requirements to facilitate this type of design approach in Missouri's permitting process.

Partners: U.S. Environmental Protection Agency, Missouri Department of Natural Resources, solid waste industry, Missouri Waste Control Coalition and Solid Waste Association of North America.

Potential Implementation Tasks:

- Encourage Missouri Waste Control Coalition and Solid Waste Association of North America to address this approach to landfill design at conferences and other training.
- Compile information on model facilities in Missouri or other states.

Illegal Dumping Enforcement and Prevention

Illegal open dumps create a public nuisance, divert land from more productive uses, depress the value of surrounding land, and pose health, safety and environmental problems. Complaint investigators in the regional offices investigate complaints regarding illegal dumping of solid waste and work with responsible parties to clean up sites. Complaints may be filed anonymously on the program's Internet Web site.

Objective 1: Work toward having a cleaner environment and use of safe disposal methods.

Actions

1a. Allocate funding sources toward illegal dumping.

Current Programs and Activities: The majority of the department's cases, complaints and investigations relate to illegal dumping. The department's Solid Waste Management Program works with local prosecutors and uses surveillance cameras to catch and prosecute illegal dumpers. The program has developed and distributed a manual for local governments that outlines how to develop an enforcement program to prevent and prosecute illegal dumping. The program also worked with volunteer and non-profit organizations to educate them in ways to prevent dumping in their areas. The Waste Tire Fund education portion has been utilized to develop brochures, hire contractors, hold workshops, etc., related to illegal dumping of tires and solid waste.

Partners: Local governments, Missouri Department of Natural Resources, contractors and Solid Waste Management Districts.

Potential Implementation Tasks: There is currently no funding for cleanup of these unsightly, dangerous sites where dumping is occurring. A program somewhat like the Waste Tire Program has been suggested as a way to clean up these sites. Some of the solid waste management districts have made inroads into identifying the dumpsites and getting volunteers to help with cleanup. However, with limited funding, this is not always an option.

1b. Enforce littering laws and educate constituents and voters regarding anti-littering campaign.

Current Programs and Activities: Department staff work with the Missouri Department of Transportation to help enhance their Adopt-a-Highway program. We are also represented on the No MOre Trash group by a staff member to work out ways to get the word out and change people's behavior and perspectives. No MOre Trash is a joint effort of the Missouri Department of Transportation and the Missouri Department of Conservation to raise awareness and increase citizen involvement in keeping roads, highways and public lands litter free.

Partners: Local governments, volunteer groups and other state agencies.

Potential Implementation Tasks:
- Continue to promote the No MOre Trash program.
- Support expansion of the Adopt-a-Highway program.

1c. Enhance enforcement activities to prevent illegal dumping, enforce existing laws and increase inspections.

Current Programs and Activities: This action is resource dependent. With less resources, the focus needs to be on doing things differently not just more often. The department is currently working on a compliance strategy that takes into consideration limited resources and will focus attention on areas most needing attention. The department's Solid Waste Management Program is also looking at priorities in the program and the regions.

The Solid Waste Management Program has conducted focused enforcement activities, such as the Illegal Dumping Enforcement Initiative where the program worked with one of the department's regional offices to deter illegal dumping by construction and demolition companies in the area. It was a six-month blitz where the staff worked nights and weekends to discover the dumping when it was occurring. The initiative was very successful and made a lot of companies aware of the law and its repercussions. The surveillance camera project is another example that is currently being implemented.

Partners: Missouri Department of Natural Resources, solid waste industry and local governments.

Potential Implementation Tasks:
- Continue to use focused enforcement activities like the Illegal Dumping - Enforcement Initiative.
- Work with partners to plan similar efforts targeting other types of wastes that are commonly dumped illegally.
- Continue development of the surveillance camera project.

1d. Regulators focus on long-term solutions and either ease or strengthen regulations. Look at the possibility of legislative action.

Current Programs and Activities: We are currently looking at our inspection and enforcement policy manual for needed changes. Long-term solutions are always being developed within the program. Examples are the many beneficial use exemptions given to promote reduction, reuse or recycling of materials that were previously sent to landfills. Another approach are the innovative enforcement tools that replace fines with supplemental environmental projects that help with

research or involve actions which improve the environment. Also, when setting up agreements with responsible parties or the court, the program always looks ahead to prevent setting precedents that do not look at long-range consequences or opportunities.

Partners: Missouri Department of Natural Resources, Attorney General's Office, industry, responsible parties, Secretary of State's Office-Administrative Rules and scoping groups.

Potential Implementation Tasks: The Solid Waste Management Program is conducting a transfer station survey to ascertain the daily problems and issues and to assist in finding ways to meet those needs in an environmentally friendly way. This activity will likely result in rule amendments.

Technical Assistance

An important element in the successful completion of the Department of Natural Resources' mission is providing technical assistance to all Missouri citizens. The Solid Waste Management Program works to help individuals, the regulated community, and other governmental groups better understand and comply with solid waste rules and regulations. The program hosts an annual landfill forum at which program staff and landfill owners and operators meet to discuss a wide variety of issues. The program and the department's five regional offices offer technical assistance through face-to-face meetings, correspondence, and telephone contacts. The program continues to work on the development of new and better ways to provide technical assistance.

Objective 1: Provide technical assistance and guidance to businesses, governments, and individuals regarding solid waste permitting and enforcement issues.

Actions

1a. Establish and maintain open lines of communication with the regulated community and the general public with respect to technical matters.

Current Programs and Activities: Although no specific named program exists regarding technical assistance, staff, on a daily basis, maintain routine communications with various constituents in support of this mission. This routine action not only maintains current lines of communication, but the very availability of staff and our quick response time fosters new partnerships as well.

Partners: Missouri Department of Natural Resources, general public and regulated community.

1b. Develop and maintain appropriate workshops regarding technical issues.

Current Programs and Activities: The Solid Waste Management Program currently holds an annual landfill forum to discuss technical issues of mutual concern to the agency and regulated community. The program also conducts certification classes for operators of landfills. Other workshops on starting environmental enforcement programs were held for local governments.

Partners: Missouri Department of Natural Resources, permitted landfills, local governments, permitted transfer stations and consulting engineers.

Potential Implementation Tasks: The success of the landfill forum is driving a desire to establish a similar type of forum for transfer stations and for consulting engineers who carry out solid waste work in the state. The Solid Waste Program is conducting a transfer station survey to ascertain the problems and issues that are being met daily and ways to meet those needs in an environmentally friendly way.

D. Special Solid Waste Issues

This section focuses on addressing wastes that may be difficult to manage; present special handling, disposal and public health problems; or have been banned from Missouri landfills. The wastes discussed in this section are composed primarily of two waste streams, household hazardous waste and items banned from Missouri landfills. Each material presents its own set of challenges and must be addressed individually. Typically these waste types can or have the potential to be recycled or beneficially reused, thereby providing an opportunity to increase the amount of material diverted from disposal in landfills.

While a Household Hazardous Waste Plan for Missouri has been developed (Appendix I), there are certain household hazardous waste items that were viewed as requiring close attention in this plan due to the immediate health and environmental hazards that they posed.

The first household hazardous waste material addressed is actually a group of items categorized as mercury-containing products. Mercury exists in three forms: elemental mercury; inorganic mercury compounds, primarily mercuric chloride; and organic mercury compounds, primarily methyl mercury. All forms of mercury are quite toxic, and each form may cause different health problems. Elemental mercury is the primary form of mercury being addressed in this section. There are numerous products in our homes or personal vehicles that contain elemental mercury. These include batteries, fluorescent lamps, tilt switches, thermometers and thermostats.

The next household hazardous waste category is End-of-Life Electronics. End-of-Life Electronics are electronics that have become obsolete as a result of developing technology, resulting in an increasingly large waste stream. Computers and televisions contain a number of toxic and hazardous material. Cathode ray tubes found in monitors and terminals contain lead, cadmium and other metals. Printed circuit boards contain chromium, lead, beryllium, mercury, cadmium, nickel, zinc, silver and gold. Batteries found in desktop computers, laptops and portable printers may contain nickel, cadmium, copper and sometimes caustic electrolytes. Mercury may also be found in the relays and switches found in desktop computers, monitors, TV picture tubes and terminals. Lead makes up about 25 percent of the weight of monitors and usually causes a monitor's cathode ray tube to exceed the Toxicity Characteristic Leaching Procedure for lead.

In order to conserve landfill space, promote recycling and reduce the chance of environmental contamination, several items have been banned from landfills. These include major appliances, lead-acid batteries, used oil, whole tires and yard waste. Although banned from disposal in Missouri landfills, these materials still need to be managed in a way that will not harm the environment. Additionally, because each of the banned items has unique characteristics in and of themselves, each must be managed in a manner different from the others.

Household Hazardous Waste

Household hazardous wastes are products or wastes discarded from homes that have hazardous characteristics, such as corrosivity, ignitability, reactivity or toxicity.

The Missouri Department of Natural Resources and the Environmental Improvement and Energy Resources Authority were given the responsibility to administer the management of household hazardous waste as well as agricultural hazardous waste. The primary focus for the Missouri Department of Natural Resources and the Environmental Improvement and Energy Resources Authority is to provide for the establishment of an education program and plan for the collection of household hazardous waste on a statewide basis.

Because of the relationships among the wastes and the disposal needs, the Missouri Department of Natural Resources and the Environmental Improvement and Energy Resources Authority added conditionally exempt small quantity generators' hazardous waste and do-it-yourselfer used oil collection to the planning process. Conditionally exempt small quantity generators can be businesses, manufacturers, local governments, schools and healthcare facilities.

The Missouri Department of Natural Resources formed an internal steering committee in 1996 with representatives from the Environmental Improvement and Energy Resources Authority and various offices in the Air and Land Protection Division and the Water Protection and Soil Conservation Division, formerly the Division of Environmental Quality. The purpose of this committee was to guide the process and timing for writing the plan.

A technical advisory group was also formed in 1996 with interested persons from outside the Missouri Department of Natural Resources. The purpose of the technical advisory group was to broaden the exchange of ideas on household hazardous waste issues. The department invited Missouri businesses, the solid waste industry, the farming community, local government offices and private individuals interested in proper management of household hazardous waste.

Conditionally exempt small quantity generators of hazardous waste can include local governments, schools, hospitals and businesses that produce small quantities of hazardous waste. Often, waste generated by conditionally exempt small quantity generators is similar in nature to household hazardous waste, although they are usually produced and accumulated in larger quantities.

Some hazardous wastes are considered Universal Waste. All universal wastes are hazardous wastes, but not all hazardous wastes are universal wastes. In order to be a universal waste, a hazardous waste must meet certain criteria established by EPA. Universal wastes, as defined in Missouri's rules, include batteries, pesticides, thermostats and mercury-containing lamps. (Appendix J)

By reducing administrative requirements, this rule is expected to save companies compliance costs and to reduce the amount of time spent on paperwork. The rule is expected to encourage collection and recycling programs that will result in more options to businesses, farmers and households for legal and cost-effective management and disposal of universal wastes.

1. Electronics

The consumer electronics waste stream is rapidly growing. This is due to an increase in the technological advances in computers and televisions. The problem is that the infrastructure for collecting, reusing and recycling electronics has not kept pace with this growing waste stream. The number of electronic products entering the waste stream is projected to increase dramatically unless reuse and recycling options expand.

A number of toxic and hazardous materials are found in computers and televisions. Cathode ray tubes found in televisions and computer monitors and terminals contain lead, cadmium and other metals. Printed circuit boards contain chromium, lead, beryllium, mercury, cadmium, nickel, zinc, silver and gold. Batteries found in desktop computers, laptops and portable printers can contain nickel, cadmium, copper and sometimes caustic electrolytes. Mercury can be found in the relays and switches in desktop computers, monitors, TV picture tubes and terminals. Lead makes up about 25 percent of the weight of monitors and usually causes a monitor's cathode ray tube to exceed the Toxicity Characteristic Leaching Procedure for lead. The Toxicity Characteristic Leaching Procedure is a testing method used to determine the hazardous characteristics or content of an item or material. Televisions would contain similar amounts of lead, depending on the style and size.

Objective 1: Maximize to the greatest extent possible, the collection, reuse and recycling of used electronics.

Actions

1a. Inform consumers of the hazardous nature of the materials in consumer electronics and encourage them to utilize recycling and reuse programs.

Current Programs and Activities: The department provides information regarding electronics upon request. Additionally, the department inspected facilities across the state that accept electronics, primarily computers and peripherals, for repair, reuse or demanufacturing. A list of these facilities is on the Solid Waste Management Program's Web site, along with a summary of options and requirements for handling electronics in Missouri.

Partners: Missouri Department of Natural Resources, Solid Waste Management Districts, consumers, recyclers, national and regional electronics waste organizations.

Potential Implementation Tasks: Increase and improve the department's efforts to share new information by posting it on the department Web site. Information on the site would include information about the hazardous components of common electronics and how they can adversely impact Missourians if not handled properly. Also included on the Web site would be links to regional and national organizations and programs including EPA efforts. Vital to this effort would be maintaining current contact information for those recyclers already listed on the Web site.

1b. Encourage the establishment of new and continued operation of existing electronics collection, recycling and refurbishing businesses.

Current Programs and Activities: Through district and state grants, assistance has been provided in establishing, expanding and funding electronics collection, recycling and refurbishing operations. The Missouri Market Development Program also provided financial and technical assistance to electronics recyclers and demanufacturing facilities.

Partners: Missouri Department of Natural Resources, Solid Waste Management Districts, Missouri Market Development Program, Missouri Department of Economic Development, local governments, retailers, manufacturers and recyclers.

Potential Implementation Tasks: Continue with current grant opportunities that would encourage the establishment of or enhance electronics collection, recycling and refurbishing operations. It is important to make an effort to maintain the competitive nature of the grants in order to increase the potential effectiveness and efficiency of the electronics collection, recycling and refurbishing projects being funded.

1c. Assist in the development of programs that encourage retailers to accept old electronics for recycling.

Current Programs and Activities: Staples and Best Buy have both had electronics recycling events. They have accepted anything from cathode ray tubes to VCRs. At a Staples event, customers who brought a product to be recycled received a discount on the purchase of a new item from the store.

Partners: Missouri Department of Natural Resources, Solid Waste Management Districts, retailers, recyclers, state and local government and manufacturers.

Potential Implementation Tasks: The department could work to bring retailers, manufacturers and recyclers together to set up cooperative arrangements beneficial to all parties. By pooling and using the existing resources and processes, promoting and executing consumer electronics collection programs at retailers could be a very cost-efficient way to manage electronics waste.

1d. Continue to participate in organizations that encourage product stewardship.

Current Programs and Activities: While there are no current programs in Missouri, the state participated in the National Electronics Product Stewardship Initiative. The Initiative was created to bring stakeholders together to develop solutions to the issue of electronic products management.

Product stewardship is a principle that addresses the need for industry, government, and consumers to promote the development and use of consumer products that pose increasingly fewer health and environmental impacts. The product stewardship approach provides incentives to manufacturers to consider the entire life-cycle impacts of a product and its packaging in product design, and to take increasing responsibility for the end-of-life products they produce. The challenge of product stewardship is to move beyond waste disposal toward zero waste and sustainable production.

Partners: Missouri Department of Natural Resources, U.S. Environmental Protection Agency, Solid Waste Management Districts, state and local governments, manufacturers, retailers and related associations, recyclers and consumers.

Potential Implementation Tasks: Continue involvement with national or regional cooperative efforts to address this issue. As outlined in the Electronics Product Stewardship Initiative of NEPSI, strive for the main goal: "...to develop a system, which includes a viable financing mechanism, to maximize the collection, reuse, and recycling of used electronics, while considering appropriate incentives to design products that facilitate source reduction, reuse and recycling; reduce toxicity; and increase recycled content."

An electronics waste workgroup would get input from stakeholders and research feasible financing mechanisms. This workgroup would also evaluate the infrastructure for this effort and make recommendations for improvement.

2. Mercury

Elemental mercury is found in many devices in homes, businesses and automobiles and is a subcategory under household hazardous waste. Exposure to elemental mercury poses both human health and environmental risks. It is important to reduce the potential harmful effects to citizens from mercury exposure and releases to the environment. Informing and educating the public about minimizing mercury exposure; promoting the elimination of non-essential uses and safe retirement of mercury, and improving scientific understanding and environmental monitoring are fundamental. The Solid Waste Management Program, the Hazardous Waste Management Program, the Outreach and Assistance Center and other departmental programs share the function of providing information regarding mercury.

Mercury-Containing Products

There are many mercury-containing items in homes, farms, labs, schools, medical facilities, and businesses. These include batteries, fluorescent lamps, mercury vapor lamps, tilt switches, thermometers and thermostats.

The department participates in the Missouri Mercury Task Force. This interagency task force includes staff from the Department of Conservation, U.S. Geological Survey, Department of Health and Senior Services, the Department of Agriculture and University Extension. This group seeks to better inform the public about minimizing mercury exposure, promote the elimination of non-essential uses and safe retirement of mercury, and improve scientific understanding and environmental monitoring of the mercury problem in Missouri. This group has developed goals and objectives. (Appendix K)

The New England Waste Management Officials Association has a great deal of information regarding mercury on their Web site. There is a Mercury-Added Products database that can be used to inform consumers, recyclers, policy makers and others about the amount and purpose of mercury in consumer products. The Web site also has model mercury education and reduction legislation and a compilation of mercy legislation in other states. It also has a searchable database that describes mercury reduction programs underway around the United States. The Web address is: www.newmoa.org/Newmoa/htdocs/prevention/mercury.

The U.S. Environmental Protection Agency has a Safe Mercury Management Web page at www.epa.gov/epaoswer/hazwaste/mercury/index.htm. This web page has information about regional and state management programs for mercury and mercury wastes.

Objective 1: Educate the public on potential mercury dangers, sources of mercury, fish advisories, take-back programs, and safer alternatives.

Actions

1a. Develop and incorporate mercury instruction and educational materials for classroom use and distribution to public.

Current Programs and Activities: Upon request, the department distributes information related to mercury and its impact on human health and the environment. Not only does the department provide information specifically related to Missouri, but also refers to other state, federal and private sources for additional information.

Although Missouri hasn't developed a curriculum specific to mercury, the Center for Ecological Training in Pittsfield, Massachusetts, has done so. This curriculum is aimed at grades 4-8, and the relevant subject areas include science, social studies, math and health.

The University of Wisconsin Extension also has a Mercury in Schools curriculum, found at www.mercuryinschools.uwex.edu/curriculum/index.htm.

Partners: Missouri Department of Natural Resources, Missouri Department of Health and Senior Services, Missouri Department of Elementary and Secondary Education, U.S. Environmental Protection Agency and the Missouri Mercury Task Force.

Potential Implementation Tasks: The Missouri Mercury Task Force could evaluate the curriculum that was developed by the Center for Ecological Training and make recommendations. Based on those recommendations, Missouri could produce, distribute and implement a mercury-specific curriculum. This project would likely require funding outside of the state's operating budget.

1b. Provide ongoing information to the public regarding hazards of mercury as well as efforts in reducing mercury contamination.

Current Programs and Activities: The department's Environmental Assistance Office provides information regarding mercury and mercury-containing products, through a toll free phone line and printed materials. In the event of a mercury spill, citizens may contact the department's Environmental Services Program emergency response.

The department and other state agencies write articles for departmental publications.

Partners: Missouri Department of Natural Resources, Missouri Department of Health and Senior Services, Solid Waste Management Districts, Missouri Mercury Task Force, retailers, schools, medical and dental offices and associations.

Potential Implementation Tasks: The department could develop a mercury Web page on the its Web site that includes a list of mercury-containing products and mercury-free alternatives, a list of collection programs and recyclers for mercury-containing products and emergency spill information. This page could also include links to other Web sites that provide information about mercury and its hazardous nature.

In addition to the Web site, informational brochures and a public service announcement campaign could be part of a mercury awareness effort. This information can be made available to schools, pharmacies, medical and dental facilities and retailers that sell mercury-containing devices.

Objective 2: Reduce potential mercury exposures and releases to the environment.

Action

2a. Encourage use of non-mercury containing devices and increase recycling opportunities for mercury-containing products.

Current Programs and Activities: Upon request, the department distributes information regarding mercury-containing devices and their non-mercury alternatives.

At three public collection events in 2002 in the Missouri counties of DeKalb and Clinton, mercury thermometers were traded for non-toxic thermometers. Nearly 15 pounds of mercury were collected, including over 900 thermometers and other mercury-containing medical equipment and elemental mercury. In addition, information regarding the hazards of mercury and spill information reached over 45,870 people via radio, newspaper and pamphlet distribution.

The State of Missouri currently has a contract with HTR-Group for fluorescent bulb recycling services for state facilities. HTR-Group, located in Lake Ozark, is the only fluorescent lamp recycler in Missouri.

Partners: Missouri Department of Natural Resources, Solid Waste Management Districts, county health officials, state and local governments, pharmacies, medical facilities, school organizations and media.

Potential Implementation Tasks: Similar trade-in events could be expanded to include more products and cover the entire state of Missouri, using Solid Waste Management District Grants or other support. Events like this reduce potential mercury exposures and releases immediately by the collection itself, and the dissemination of information regarding the potential hazards of mercury may help avoid future mercury releases.

Grants could be used to encourage recycling facilities to develop collection programs for common mercury-containing products. For example, a person would be more likely to recycle their fluorescent lamps or mercury fever thermometer if they could to it at the same time as they recycle their aluminum cans.

Grant moneys could be used to increase or improve storage, increase safety, educate and certify employees to handle the materials and for increased advertising and marketing efforts.

2b. Promote industry-sponsored take-back programs for mercury-containing products.

Current Programs and Activities: In 2003, Missouri had 12 participating wholesalers in The Thermostat Recycling Corporation. The Thermostat Recycling Corporation is a not-for-profit corporation established by Honeywell, White-Rodgers and General Electric to operate a thermostat-recycling program. Wholesalers place recycling containers at a convenient spot at each branch location in the participating state. Dealers collect out-of-service wall-mounted mercury switch thermostats through their normal business operation and drop them off periodically into the collection box. When the collection container is full, The Thermostat Recycling Corporation pays the wholesaler's shipping costs. The program accepts all brands of residential wall-mounted mercury thermostats. For more information, call the Thermostat Recycling Corporation at 1-800-238-8192 or find them on the Web at www.nema.org/gov/ehs/trc/.

Partners: Missouri Department of Natural Resources, Solid Waste Management Districts, homebuilders, dental and medical professionals and their related associations, manufacturers, retailers, contractors, recyclers, state and local governments and citizens of Missouri.

Potential Implementation Tasks: Research available recycling programs similar to the Thermostat Recycling Corporation's program. Make information about these programs available to partners and work to coordinate efforts to begin using these programs if they are not already doing so. If no program exists for a particular product, research the feasibility of establishing one. Provide findings to manufacturers and other potential sponsors.

Materials Banned from Missouri Landfills

Since Jan. 1, 1991, the Missouri Solid Waste Management Law, Section 260.250 RSMo, has prohibited the disposal of certain items from landfill disposal in order to conserve landfill space, promote recycling and reduce the possibility of environmental contamination. These banned items include major appliances, used oil, lead-acid batteries, waste tires and yard waste.

1. Major Appliances

Major appliances, also known as white goods, are defined in the Missouri Solid Waste Management Law as "…clothes washers and dryers, water heaters, trash compactors, dishwashers, conventional ovens, ranges, stoves, woodstoves, air conditioners, refrigerators and freezers."

In September 2002, the Midwest Assistance Program received a grant from the Missouri Department of Natural Resources to identify the barriers to recycling major appliances and make recommendations to enhance recycling and reduce illegal dumping of major appliances. As part of this study (Appendix L), Midwest Assistance Program prepared a questionnaire that was distributed to over 1,700 stakeholders. The questionnaire contained three basic questions regarding which appliances are the most difficult to recycle, the barriers to recycling major appliances, and the solutions to overcoming the barriers. Ten focus groups were also held throughout the state to discuss the problem and recommend solutions for recycling major appliances.

The study concluded that the main barriers to major appliance recycling are economic. Consumers, the solid waste industry and the appliance industry are facing higher recycling costs for major appliances and looking to the state for assistance. It was determined that a decision needed to be made as to how much of the cost should remain with consumers and business, how much could be reduced through good information and education and how much should be subsidized by government programs. The recommendations receiving positive rankings in the prioritization process of the study have been included below as actions.

Objective 1: Reduce illegal dumping and increase recycling of major appliances.

Actions

1a. Provide additional information and education materials regarding major appliance recycling to public and private sectors.

Current Programs and Activities: The department distributes information regarding major appliances on request. For individuals having Internet access, information is available on the department's Web site.

Partners: Missouri Department of Natural Resources, Solid Waste Management Districts, local governments, Missouri Recycling Association and consumers.

Potential Implementation Tasks:
- Improve and increase efforts to share this information.

1b. Encourage solid waste management districts to conduct major appliance collections.

Current Programs and Activities: Major appliance collection events have been sponsored by cities, counties, and solid waste management districts. Solid Waste Management District Grants have funded various projects regarding major appliances. Since 1995, they have funded 39 projects (major appliance collection events and others) that have recovered 14,968 tons of waste.

State Project Grants funded an inter-community major appliance collection event in 2000. They have also been used to purchase tools, balers, conveyors and other equipment for businesses involved in day-to-day collection and recycling of major appliances. Since 1999, project grants have funded 16 projects, resulting in the recovery of 4,625 tons of waste.

Partners: Missouri Department of Natural Resources, Solid Waste Management Districts, local governments, private businesses and citizens.

Potential Implementation Tasks:
- Encourage more solid waste management districts and city and county governments to sponsor collection events. Work on ways to better publicize these efforts.

1c. Provide funding for freon extraction certification and equipment.

Current Programs and Activities: Solid Waste Management District Grants have been used for the purchase of refrigerant recovery equipment and certification and purchase of balers, crushers, trailers and other machinery. They have funded construction of buildings and purchase of collection containers. Grant funds have been used for educational programs and for operational costs for entities involved in ongoing collection and recycling of major appliances.

Partners: Missouri Department of Natural Resources, Environmental Improvement and Energy Resources Authority, Solid Waste Management Districts, private businesses, county and municipal governments.

Potential Implementation Tasks:
- Work with partners to maintain or increase current grant funds available for these types of activities.

1d. Create a fee system to subsidize white goods recycling and illegal disposal cleanup.

Current Programs and Activities: There is currently no fee system to subsidize white goods recycling in Missouri. The department's Solid Waste Management Program and regional offices work to locate illegal dump sites, identify responsible parties, negotiate cleanups and settlements, and pursue legal action where necessary. Complaints and reports of illegal dumps may be made anonymously on the Solid Waste Management Program's Internet Web page.

North Carolina has an advanced disposal fee on major appliances that went into effect on Jan. 1, 1994. Fees of $10 for major appliances that contain chlorofluorocarbons and $5 for those that do not were the result of the passage of Senate Bill 60 during the 1993 Legislative Session. The major appliance fee was extended for three years through legislative action in June 1998, but at a lower rate ($3 per appliance versus the previous two-tiered fee). The major appliance legislation required counties to implement a comprehensive management program for a waste stream that has traditionally been given low priority. As a result of the program all counties now have a written major appliance management plan, and many closely monitor and report tonnages, costs, and income.

Since the advanced disposal fee on major appliances went into effect, illegal dumping has been greatly reduced; however, some illegal dumps remain. The strong impact on dumping has been due to removal of landfill disposal fees and a more convenient infrastructure for collection of major appliances. The program has provided the funds needed to jumpstart county management activities. Counties access the White Goods Management Account by obtaining grants that make it unnecessary for them to accumulate funds during a period of years in order to purchase needed equipment and make capital improvements. Funds in the White Goods Management Program have made it possible for counties to purchase specialized equipment for chlorofluorocarbon recovery and to construct collection and loading areas.

Partners: Missouri Department of Natural Resources, Missouri Attorney General's Office, local law enforcement agencies, private citizens and businesses, Missouri legislature.

Potential Implementation Tasks:

- Increase department's usage of concealed cameras to catch and prosecute illegal dumpers in rural areas.
- Provide instruction for local law enforcement agencies in the use of surveillance cameras at known illegal dumpsites.
- Encourage the legislature to consider an Advanced disposal fee, similar to the North Carolina program.

1e. Encourage better end markets for scrap metal.

Current Programs and Activities: The Missouri Market Development Program provides financial and technical support for recycling market development in Missouri. Information regarding these programs is provided in the recycling market development portion of this plan.

Partners: Missouri Department of Natural Resources, Missouri Market Development Program, Solid Waste Management Districts and metal processors and recyclers.

Potential Implementation Tasks: As discussed in the major appliance study conducted by Midwest Assistance Program, there are no end markets such as mills or foundries for ferrous scrap in Missouri. All scrap is transported to mills in other states or to seaports for shipment abroad. The study proposed that a small steel mill, particularly in the Kansas City area, could lower transportation costs and raise the prices paid for scrap. The study concluded that a market-driven solution was better than a government subsidy program. Tax credits for scrap dealers was offered as a possible solution, but it was noted any tax changes would have to come from the legislature and would be difficult in the present economic climate.

1f. Assist small businesses that want to collect major appliances by streamlining the regulatory process.

Current Programs and Activities: The Midwest Assistance Program's white goods survey identified that many small independent scrap dealers go out of business or operate illegally because they do not understand the regulations governing refrigerant removal, removal of oil and capacitors, and transportation of scrap materials.

The department's Environmental Assistance Office, regional offices and Solid Waste Management Program offer assistance to small businesses in understanding and complying with state and federal regulations.

Partners: Missouri Department of Natural Resources, U.S. Environmental Protection Agency and the Missouri Department of Transportation.

Potential Implementation Tasks: The department should continue to strengthen their knowledge of all regulations concerning major appliance collection and recycling through continued coordination with other agencies involved. Educational workshops and materials could be developed to assist businesses and individuals in understanding regulatory requirements, as well as writing a business plan and preparing grant applications for equipment purchases.

1g. Encourage reuse, repair and recycling of major appliances.

Current Programs and Activities: Some businesses that sell and deliver appliances will remove old appliances at no charge or for a small fee. Many have arrangements with individuals or scrap yards that pick up old appliances from their establishment. There are also individuals and businesses that pick up old appliances free of charge and then refurbish and sell them as used. These businesses sometimes run ads in local newspapers and telephone Yellow Pages.

The department's Solid Waste Management Program, regional offices and Outreach and Assistance Office offer assistance to businesses and individuals in locating recycling facilities in their area.

Appliance Recycling Centers of America has partnered with Whirlpool Corporation to recycle used appliances that are scrapped when Whirlpool sells replacement units to apartment complexes, under an early-retirement incentive sponsored by two electric utilities in California. This effort intends to replace older refrigerators with more energy-efficient models.

Columbia River PUD, a publicly owned utility in Oregon, offers citizens who purchase a new energy-efficient appliance a rebate of $25-$75, and pay even more if the customer turns in an old appliance when they purchase the new one. Those who wish to recycle an appliance but are not purchasing a new one may receive a rebate of up to $15 off their electric bill.

Partners: Missouri Department of Natural Resources, U.S. Environmental Protection Agency, local governments, retailers, manufacturing industry, scrap and salvage operations, electric utilities, Missouri Recycling Association and Solid Waste Management Districts.

Potential Implementation Tasks:
Work with partners to bring retailers and salvage operators together to set up cooperative arrangements beneficial to both parties.

Encourage electric utilities, appliance recyclers and manufacturers to create incentive programs similar to the Columbia River PUD.

2. Lead-Acid Batteries

The Missouri Solid Waste Management Regulations, 10 CSR 80-2.010(52) define lead acid battery as "…a battery designed to contain lead and sulfuric acid with a nominal voltage of at least six (6) volts and of the type intended for use in motor vehicles and watercraft." Retailers are required by law to accept a used lead acid battery in exchange for a newly purchased battery. Lead acid batteries, those used in cars, boats, and other vehicles, contain sulfuric acid that reacts with lead and lead oxide to generate electricity. Some retailers will accept old batteries even without the purchase of a new battery.

Objective 1: Continue collection and recycling of lead-acid batteries.

Action

1a. Work with retailers and solid waste management districts to continue collection of lead-acid batteries.

Current Programs and Activities: Retailers of automotive batteries are required by law to accept one used battery for each new battery purchased. Solid waste management districts sponsor regional household hazardous waste collection events, at which lead acid batteries may be accepted.

Partners: Missouri Department of Natural Resources, Solid Waste Management Districts, local governments, retailers and private citizens.

Potential Implementation Tasks: Work with partners to increase the number of facilities accepting used batteries without requiring the purchase of a new battery. Work with solid waste management districts to increase the number of household hazardous waste collection events. The department could prepare new technical bulletins providing information on general battery waste management and lead acid battery recycling.

3. Used Oil

Used oil, as defined in 10 CSR 80-2.010(110), means "…any motor oil which as a result of use, becomes unsuitable for its original purpose due to loss of original properties or the presence of impurities, but…shall not include ethylene glycol used for solvent purposes, oil fibers that have been drained of free-flowing used oil, oily waste, oil recovered from oil tank cleaning operations, oil spilled to land or water, or industrial nonlube oil such as hydraulic oils, transmission oils, quenching oils, and transformer oils." The improper disposal of used oil causes unnecessary contamination to ground and surface water. Householders who change their own oil, known as do-it-yourselfers, and farmers who generate less than 25 gallons per month from farm vehicles or machinery in a calendar year are exempt from the regulations governing used oil (10 CSR 25-11.279).

In January 2000, the department's Technical Assistance Program (now part of the Outreach and Assistance Center) prepared a report on household hazardous waste management entitled, *A Missouri Plan for Safe Management and Collection of Household Hazardous Waste, Family Farm Waste, and Conditionally Exempt Small Quantity Generator Waste and Do-It-Yourselfer Used Oil*. This report provided information on all aspects of used oil management as well as do-it-yourselfer used oil collection.

Objective 1: Encourage continued proper management and recycling of used oil and increase voluntary participation of businesses and local governments in do-it-yourself used oil collection programs.

Actions

1a. Educate public, private and business sectors about proper management techniques and recycling opportunities for used oil through written and media avenues.

Current Programs and Activities: Citizens can call the Environmental Assistance Office at 1-800-361-4827 or their solid waste management district planner for used oil recycling locations in their community.

Partners: Missouri Department of Natural Resources and Solid Waste Management Districts.

Potential Implementation Tasks:

– Missouri Department of Natural Resources could develop television and radio ads providing information on recycling of used oil, as well as other items.

1b. Encourage more district household hazardous waste collection programs to include used oil in their collections.

Current Programs and Activities: Solid waste management districts periodically sponsor household hazardous waste collection events, at which used oil is accepted.

Partners: Missouri Department of Natural Resources, Solid Waste Management Districts and local governments.

Potential Implementation Tasks:

– Encourage establishment of more permanent household hazardous waste collection facilities in more areas of the state.

1c. Target grants to develop used oil recycling and collection enterprises.

Current Programs and Activities: Both Solid Waste Management District Grants and State Project Grants have been awarded to fund household hazardous waste collection events.

A model for used oil management is the program established in 1984 by the Florida Department of Environmental Protection. Florida's Used Oil Recycling Program has grown to become one of the most successful in the United States and has received national recognition. The program consists of a registration and record keeping program for used oil handlers, a permitting program for used oil processors and technical assistance to the public and regulated community. The 1988 Florida Legislature approved a one-time appropriation of funds amounting to $1 million for local government grants for establishing public used oil collection centers and $1.5

million for statewide incentive and awareness and educational programs aimed at Do-It-Yourself oil changers and school students.

Partners: Missouri Department of Natural Resources, Solid Waste Management Districts, local governments, private businesses and private citizens.

Potential Implementation Tasks:
- Work with partners to develop a program similar to the Florida model.

Objective 2: Provide technical assistance and information regarding used oil collection locations in the state.

Action

2a. Compile and maintain a database of all used oil collection services in the state.

Current Programs and Activities: The department's Solid Waste Management Program maintains a listing of used oil collection service providers based on information provided by the solid waste management districts. The department's Outreach and Assistance Center and solid waste management districts receive notifications of do-it-yourselfer used oil collection centers and maintain a listing of this information.

Partners: Missouri Department of Natural Resources, Solid Waste Management Districts, local governments and private businesses.

Potential Implementation Tasks:
- Promote the information sources available from the department and the solid waste management districts.

4. Whole Tires

Waste tires began stacking up nationwide after World War II as automobile traffic increased. By 1990, the illegal disposal of waste tires in Missouri had become so widespread that the General Assembly passed the state's first waste tire law, Senate Bill 530. To date, over 12 million tires have been cleaned up from 449 tire dumps. Approximately 1.5 million remain to be cleaned up from known waste tire dumps. There may be as many as 1 million additional tires in dumps that are not known to the department.

When waste tires are not disposed or recycled properly, they pose serious threats to human health and the environment. Tires that are improperly stored for extended periods of time frequently catch fire as a result of accidents, vandalism and arson. Fires from waste tires release hazardous substances into the air and possibly into groundwater sources and can burn for months or even years. Waste tires in the environment provide a perfect breeding ground for mosquitoes. Cleaning up waste tires and other trash that can contain even small

amounts of water is a very effective way to reduce mosquito breeding sites and thus reduce the spread of mosquito-borne illnesses such as West Nile virus.

The department has been working with the Waste Tire Advisory Council to discuss the need for an extension of the tire fee and the future direction and focus of the department's waste tire management efforts. The council is comprised of tire industry members, state legislators, department staff and representatives from other state agencies. Their recommendations are included in this report as actions. (Appendix M)

Objective 1: Provide incentives that encourage the safe and environmentally sound management of waste tires, minimizing disposal and maximizing recycling of waste tires into Tire-Derived-Fuel (TDF) and beneficial end use products such as playground cover material. This objective addresses the five percent of waste tires currently not accounted for in the current infrastructure of the waste tire industry.

Actions

1a. Require permits for waste tire sites, processors and haulers.

Current Programs and Activities: The Solid Waste Management Program is responsible for permitting waste tire sites and processors. On March 19, 2001, Governor Holden signed Executive Order 02-03 designating the Missouri Department of Transportation to run the commercial-carrier industry's One-Stop Shop for all its licensing and permit needs. As a result of the executive order, the Solid Waste Management Program reviews waste tire hauler applications for environmental compliance and provides comments to the Missouri Department of Transportation. Permit issuance is now the Department of Transportation's Motor Carrier Safety Unit's responsibility. There are currently 76 permitted waste tire haulers working in Missouri. The regional offices' waste tire staff provide concurrence on the permits for the sites, processors and haulers.

Partners: Missouri Department of Natural Resources and the Missouri Department of Transportation.

Potential Implementation Tasks: No new program is needed if the waste tire fee is reauthorized. Streamlining of the permitting process can be explored.

1b. Enhance established controls for permitting, enforcement and inspections.

Current Programs and Activities: The Solid Waste Management Program and the department's Regional Offices are responsible for implementing the permitting process. Regional Office waste tire staff, who provide concurrence or nonconcurrence to the Solid Waste Management Program, review permits for the waste tire sites and processors. The sites and processors are then notified of the approval or denial of the permit.

The Regional Offices' waste tire staff also reviews the Waste Tire Hauler Permits. The Solid Waste Management Program faxes the Notice of Concurrence or

Nonconcurrence to the Missouri Department of Transportation who approves or denies the permit accordingly.

Inspections and enforcement are considered by industry to be the most important aspect of the existing controls.

Partners: Missouri Department of Natural Resources and the Missouri Department of Transportation.

Potential Implementation Tasks:
- Increased enforcement and inspections of prospective sites, processors and haulers will enhance the permitting, enforcement and inspection controls.

1c. Ensure that tire collection centers such as tire retailers, service stations and salvage yards are properly managed to prevent vermin and fire hazards by recycling or disposing of tires.

Current Programs and Activities: The Solid Waste Management Program and the Regional Offices' waste tire staff are responsible for the inspection and oversight of tire collection centers to ensure the proper management and recycling of waste tires.

Partners: Missouri Department of Natural Resources and the waste tire industry.

Potential Implementation Tasks:
- Continue efforts to reauthorize the fee and develop flexibility in the funding of the program.
- The increased flexibility in funding may allow inspectors to provide additional enforcement through increased inspections of the tire collection centers.
- Currently, the program is able to inspect about 20 percent of the existing retailers annually.

1d. Address the five percent of waste tires that are not accounted for through the existing infrastructure by enhancing the tracking system.

Current Programs and Activities: The Solid Waste Management Program, the regional offices' waste tire staff and the tire industry are responsible for addressing the waste tires that are not accounted for through the existing infrastructure by enhancing the tracking system.

Partners: Missouri Department of Natural Resources and the tire industry.

Potential Implementation Tasks:
- The Waste Tire Tracking System database will be developed to allow for the auto-population of data specific to the tire retailers, permitted waste tire haulers, and permitted waste tire processing facilities that accept the waste tires.
- The database should be made available to the regional offices' waste tire staff.

- The Waste Tire Tracking system will be enhanced due to the data being entered by the regional office staff who conduct the inspections of the tire retailers, haulers and processing facilities. Enhancements are more timely data entry and more accessible data at regional office level for inspection planning to reach goals.
- Making the Waste Tire Tracking System available to the regional offices will help with accounting for five percent of waste tires currently unaccounted for in the infrastructure.
- The increased flexibility in funding may also allow for inspectors to provide additional enforcement through increased inspections of the tire collection centers.

1e. Increase collection center inspections.

Current Programs and Activities: The expiration of the waste tire fee has caused the stoppage of inspections by regional offices' waste tire staff. If the waste tire fee is re-authorized, there will still be a need for changes in the fund distribution to allow for the increase in center inspections.

Partners: Missouri Department of Natural Resources and the tire industry.

Potential Implementation Tasks: The increased flexibility in funding may allow more inspectors to provide additional enforcement through increased inspections of the tire collection centers.

Objective 2: Provide technical assistance to citizens, local governments, non-profit organizations, institutions, business and the waste tire industry in order to assist them in reducing waste tires at the source, using alternatives to disposal and using sound practices for properly managing waste tires. The technical assistance will provide them with options for the cleanup, proper disposal and recycling of waste tires to prevent illegal waste tire dumps, infectious diseases and tire fires.

Actions

2a. Conduct inspections and enforcement actions against violators of the waste tire law.

Current Programs and Activities: The Solid Waste Management Program, the Outreach and Assistance Center, solid waste management districts and the Regional Offices' waste tire staff are responsible for the prevention and enforcement of illegal waste tire dumps.

Partners: Missouri Department of Natural Resources, Missouri Department of Health and Senior Services, tire industry, Solid Waste Management Districts and local governments.

Potential Implementation Tasks:

- Continue education efforts of the Outreach and Assistance Center, the Solid Waste Management Program, Regional Offices' waste tire staff and local governmental entities to increase awareness of the dangerous facets of waste tires with respect to infectious diseases transmitted through mosquitoes and other vermin as well as waste tire fires.
- Continue to reimburse non-profit organizations for the proper disposal of waste tires collected at cleanup events.

2b. Assist local governments with waste tire control efforts and illegal dump cleanups.

Current Programs and Activities: The Solid Waste Management Program works closely with local governments to prevent and clean up illegal waste tire dumps. Governmental entities are only eligible for innocent party waste tire cleanups if they can prove ownership of the property in question. However, local governments can work with non-profit organizations to conduct citywide and countywide waste tire cleanup events. The solid waste management districts work with local governments on waste tire control efforts.

Partners: Missouri Department of Natural Resources, Solid Waste Management Districts and the tire industry.

Potential Implementation Tasks:

- Continue to work closely with local governments and non-profit organizations to coordinate and plan waste tire cleanup events and disseminate information on proper waste tire disposal.
- Continue to reimburse non-profit organizations for the proper disposal of waste tires collected at cleanup events.
- Work closely with solid waste management districts to ensure that their amnesty day enhances the current infrastructure for managing waste tires.

2c. Provide technical assistance to the public, legislators and other officials, tire retailers and recyclers.

Current Programs and Activities: The Solid Waste Management Program and the Regional Offices' waste tire staff respond to questions from the waste tire industry, the public, legislators and other officials. The program developed several technical bulletins and fact sheets about waste tire issues. The program also has assisted with the development and composition of a Web site that provides extensive information for the public and the waste tire industry.

Partners: Missouri Department of Natural Resources.

Potential Implementation Tasks:

- Continue to develop informational materials as new technologies and issues emerge.

- Revise reports for the legislators to provide information on the progress and needs of the program.
- Provide these reports and other information on the Web site as appropriate.

2d. Disseminate the *Management of Waste Tire - Technical Bulletin* on how to prevent tires from becoming mosquito breeding grounds.

Current Programs and Activities: The department provides paper copies and online access to the technical bulletins for the purpose of disseminating pertinent information. The Department of Health and Senior Services uses their Web site and weekly newsletters to disseminate information on the hazards of waste tires to local public health agencies.

Partners: Missouri Department of Natural Resources and the Missouri Department of Health and Senior Services.

Potential Implementation Tasks:
- Regional Offices' waste tire staff continue to distribute the *Management of Waste Tires -Technical Bulletin* to violators of solid waste management law.
- The technical bulletins may also be accessed on the department's Web site:
  - → *Management of Waste Tires – Technical Bulletin* http://www.dnr.state.mo.us/oac/pub2056.pdf
  - → Department of Health and Senior Services Web site: http://www.dhss.state.mo.us/WestNileVirus/
  - → Solid Waste Management Program Web site: http://www.dnr.state.mo.us/alpd/swmp/tires/tirelist.htm

2e. Provide information on tire fire prevention through the *Response to Tire Fires –Technical Bulletin.*

Current Programs and Activities: The departmentr provides paper copies and online access to this and other technical bulletins for the purpose of disseminating pertinent information.

Partners: Missouri Department of Natural Resources.

Potential Implementation Tasks:
- The technical bulletins may also be accessed on the department's Web site:
  - → *Response to Tire Fires – Technical Bulletin* http://www.dnr.state.mo.us/oac/pub2062.pdf

2f. Provide monetary assistance for the cleanup of innocent party tire dumps statewide to prevent mosquito-borne illnesses and the proliferation of vermin.

Current Programs and Activities: The Solid Waste Management Program works with the Regional Offices' waste tire staff to make determinations of innocent party status. Once the investigation is complete and the innocent party status is

concurred upon between the program and the Regional Offices' waste tire staff, the waste tire dump is scheduled for cleanup.

Partners: Missouri Department of Natural Resources.

Potential Implementation Tasks:
- Promote 100 percent state-funded waste tire cleanups at innocent party sites located on private property.
- This promotion could coincide with new Less than 20,000 Strategy project promotions.

2g. Offer incentives to property owners who self-report their tire dumps to sign innovative settlement agreements.

Current Programs and Activities: The Solid Waste Management Program, the Regional Offices' waste tire staff and the Attorney Generals' Office work with property owners who self-report their waste tire dumps to the program to come to an agreement. This special initiative project was called the Less than 20,000 Strategy. The project protects the environment, cleans up the site and allows for some cost recovery for the state to clean up the site.

The Less than 20,000 Strategy project was initiated on Nov. 2, 2002, and ran through April 30, 2003. The project revealed 100 unknown waste tire dumps with approximately 480,000 waste tires.
Partners: Missouri Department of Natural Resources, Missouri Attorney General's Office, private landowners and contractors.

Potential Implementation Tasks:
- Renew this initiative and consider new projects of a similar nature.

2h. Reimburse non-profit groups for their waste tire cleanups to encourage citizen participation in the maintenance of our environment and to educate the public.

Current Programs and Activities: The Solid Waste Management Program currently reimburses non-profit groups for the proper disposal of waste tires. There are no other incentives for the non-profit group to conduct the waste tire cleanup event other than the fact that their work helps cleanup the environment.

Partners: Missouri Department of Natural Resources, non-profit organizations, local governments and contractors.

Potential Implementation Tasks:
- Continue to provide a monetary incentive for incidental costs for nonprofit organizations to clean up and remove waste tires. The funds will help pay for the cost of protective clothing such as gloves for the volunteers as well as other incidental cost that may be associated with the cleanup of waste tires.

Objective 3: Develop the waste tire market to the point where waste tires have value. In doing so, the waste tires currently in dumps will be removed from the dumps by the landowners themselves, and taken to the waste tire recyclers to be used as a raw material in the manufacture of tire-derived fuel and new products.

Actions

3a. Provide grants for schools, parks and other non-profit entities to purchase playground cover made from tires to protect children from injuries from falls.

Current Programs and Activities: The Solid Waste Management Program administers the waste tire material playground cover grant projects. The recipient of each grant is responsible for purchasing and installing the waste tire material on the playground. After the material is installed and paid for, the Regional Offices' waste tire staff inspect the site. The recipient is then reimbursed for the cost of the material and the delivery costs.

Partners: Missouri Department of Natural Resources, public school districts, local governments and non-profit organizations.

Potential Implementation Tasks:

- Promote the waste tire material grants in urban and rural areas of the state where the grants are not being utilized.
- Target mailings, calls, media promotions and solid waste management districts in rural and urban areas of the state where grants have not been utilized.

3b. Promote the use of rubberized asphalt and the use of crumb rubber in the manufacture of new products.

Current Programs and Activities: The Solid Waste Management Program has attempted to communicate with the Missouri Department of Transportation by submitting information on the usage of rubberized asphalt in roads throughout the country. The Missouri Department of Transportation has stated that they believe the material is not cost effective.

Partners: Missouri Department of Natural Resources, Missouri Department of Transportation, waste tire industry, asphalt industry and the Missouri Market Development Program.

Potential Implementation Tasks:

- Subsidize rubberized asphalt projects with the Missouri Department of Transportation and the Missouri Market Development Program.
- Promote civil engineering projects using waste tire material in highway construction such as lightweight fill and drainage.
- Increase the number of waste tire material playground grant projects.
- Support the use of waste tires in other civil engineering applications.

– Promote landfill projects using waste tire material as a liner protection layer, in leachate and methane gas collection system, and as a drainage layer under final cover.

3c. Encourage power plants to use tire-derived fuel, lowering their emissions and using more tires.

Current Programs and Activities: The Solid Waste Management Program collects data on the tire-derived fuel usage in the state through end user registration.

Partners: Missouri Department of Natural Resources, power plants and cement kilns.

Potential Implementation Tasks:

– Regulatory requirements for the use of tire-derived fuel will be evaluated to determine if changes to regulations are needed to encourage the use of tire-derived fuel.

3d. Augment market development via Waste Tire Grant Program.

Current Programs and Activities: The current statute limits funding for grants to five percent of the revenues collected, currently $85,000 to $100,000 per year. This limitation virtually eliminates meaningful market development. As a result, waste tire material grants for playground cover under equipment are the only market development tools in use.

Partners: Missouri Department of Natural Resources, public school districts, local governments and non-profit organizations.

Potential Implementation Tasks:

– Require all state parks to use the waste tire material in the form of shredded waste tires at a minimum and encourage mats and pour in place material where appropriate.
– The Waste Tire Advisory Council recommends that future legislation provide the department more flexibility with the funding. This flexibility could be accomplished by changing the allocation percentages stated in the existing statute.

3e. Coordinate with other state agencies and industry to introduce more waste tire-derived materials in their projects and the use of waste tires in civil engineering applications.

Current Programs and Activities: The department's Outreach and Assistance Center is currently responsible for coordination with other state agencies for the development of more waste tire-derived materials.

Partners: Missouri Department of Natural Resources, other state agencies and the Environmental Improvement and Energy Resources Authority.

Potential Implementation Tasks:

- Use the grant program to stimulate the market development for waste tire materials.
- Encourage the use of waste tire material in landfill civil engineering and rubberized asphalt projects in the state.

Yard Waste

Yard waste is made up of leaves, grass clippings, yard and garden vegetation and Christmas trees. Until 1992, much of this yard waste went into Missouri's landfills. Since the yard waste ban became effective, more than 300 communities in the state have yard waste collection services. Yard waste can be easily composted to produce beneficial products such as soil amendments or mulch. Yard waste composting is a sensible solid waste management alternative for Missouri municipalities. The department's Solid Waste Management Program and the Outreach and Assistance Center provide technical assistance regarding composting activities. Regulatory aspects of yard waste composting are handled by the Solid Waste Management Program in coordination with the department's Water Protection and Soil Conservation Division.

Actions for managing yard waste are found in the Organics in Solid Waste segment of the Managing Waste as a Resource section.